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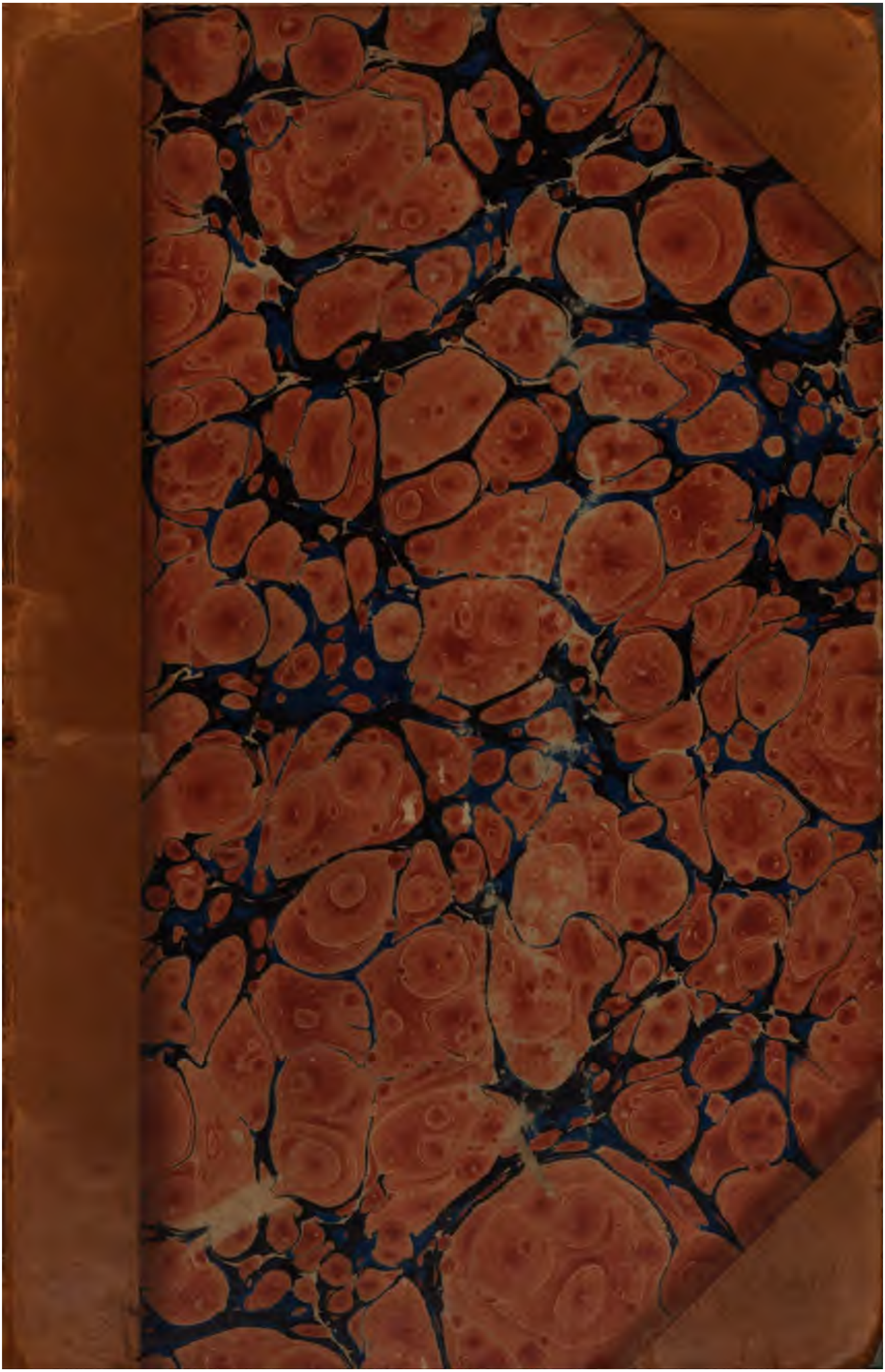

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A Compendious History of Smallpox; with an Account of a Mode of Treatment, Constitutional and Local, which renders the Disease Comparatively Harmless, and prevents those Deformities occasioned by the Ulceration of the Skin. By Henry George, Surgeon. London, 1852, 8vo. Pp. 134.

A Practical Sketch of Low Inflammations. By S. F. Statham, Assistant Surgeon, University College Hospital, London, 1852. 8vo. Pp. 41.

A System of Practical Surgery. By William Fergusson, F.R.S.; Professor of Surgery in King's College, London; Surgeon to King's College Hospital; Head Surgeon to H.R.H. Prince Albert. Third Edition. London, 1852. Post 8vo. Pp. 846.

A Manual of Elementary Chemistry, Theoretical and Practical. By George Fownes, F.R.S., late Professor of Practical Chemistry in University College, London. Fourth Edition. Revised and Corrected. London, 1852. Post 8vo. Pp. 681.

On Rheumatism, Rheumatic Gout and Sciatica, their Pathology, Symptoms, and Treatment. By Henry William Fuller, M.D., Cantab., Fellow of the Royal College of Physicians, London; Assistant Physician to St George's Hospital, &c., &c. London, 1852. 8vo. Pp. 403.

A Commentary of Medical and Moral Life; or Mind and the Emotions considered in relation to Health, Disease, and Religion. By William Cooke, M.D., M.R.C.S., Editor of Morgagni on the Seats and Causes of Diseases, with Notes; author of a Practical Treatise on Diseases of the Digestive Organs, &c. London, 1852. 12mo. Pp. 304.

The Nature, Symptoms, and Treatment of Consumption: Being the Essay to which was awarded the Fothergillian Gold Medal of the Medical Society of London. By Richard Payne Cotton, M.D., Member of the Royal College of Physicians, London; and Assistant Physician to the Hospital for Consumption and Diseases of the Chest. London, 1852. 8vo. Pp. 286.

A Treatise on Tuberculosis, the Constitutional Origin of Consumption and Scrofula. By Henry Ancell, late Surgeon to the Western General Dispensary, and Lecturer on Materia Medica and Medical Jurisprudence in the School of Anatomy and Medicine adjoining St George's Hospital; author of a Course of Lectures on the Physiology and Pathology of the Blood, &c., &c. London, 1852. 8vo. Pp. 779.

Report of the Proceedings of the Pathological Society of London. Sixth Session, 1851–1852. London. 8vo. P. 201 to p. 475, concluding Volume Third.

A Practical Handbook of Medical Chemistry. By John E. Bowman, F.C.S., Professor of Practical Chemistry in King's College, London. Second Edition. London, 1852. 12mo. Pp. 261.

Dietetics of the Soul. By Ernest Von Feuchtersleben. Edited from the Seventh Edition. London, 1852. 12mo. Pp. 202.

Observations on Coroners. By William Hewitt, Surgeon, North Walsham, &c. No date, but printed at Norwich. 8vo. Pp. 62. (October 1852.)

Ueber der Einfluss des Nervensystems auf die Bewegung der Iris Von Professor Julius Budge in Bonn (Aus dem Archiv fur Physiologische Heilkunde, 1852.) 8vo. Seite 56.

Facts and Observations connected with the Management of the Marine and Emigrant Hospital, Quebec, including a Report of the Trial and Acquittal of Thomas Burke for the Manslaughter of William Lawson, who died from Neglect and Improper Treatment in the Hospital. By William Marsden, M.D., Governor of the College of Physicians and Surgeons of Canada East, &c. Quebec, 1852. 8vo. Pp. 31.

Morse's Patent. Full Exposure of Dr Charles J. Jackson's pretensions to the Invention of the American Electro-Magnetic Telegraph. By Hon. Amos Kendale, Last Postmaster-General, U.S. Washington, 1852. 8vo. Pp. 64.

An Essay on the Action of Medicines on the System; or on the mode in which Therapeutic Agents introduced in the Stomach produce their peculiar Effects on the Animal Economy. Being the Prize Essay to which the Medical Society of London awarded the Fothergillian Gold Medal for MDCCCLII. By Frederick William Headland, B.A., M.R.C.S., &c. London, 1852. 8vo. Pp. 346.

On the Resources of King's College, London, for Medical Education: being the Lecture Delivered at the Opening of the Medical Classes in that Institution on the 1st October 1852. By Robert Bentley Todd, M.D., F.R.S., Fellow and Censor of the R. C. of Physicians of London, Physician to King's College Hospital, and Professor of Physiology in King's College, London. London, 1852. 8vo. Pp. 53.

On the Nature and Treatment of some Painful Affections of Bone, read before the Med.-Chirurg. Society of Queen's College, Birmingham, on Tuesday, 19th October 1852. By Langston Parker, Professor of Anatomy in Queen's College, &c. London, Birming., 1852. 8vo. Pp. 16.

Chronische Alkoholskrankheit oder Alkoholismus Chronicus. Ein Beitrage zur Kenntniss der Vergiftungs Krankheiten, nach Eigener und Anderer Erfahrung. Von Dr Magnus Huss, Professor der Med. Klinik an Kongl. Carolinischen Med. Chirurgischen Institute zu Stockholm, &c. &c. Aus dem Schwedische Ubersetz mit Aenderungen und Zusazen der Verfassers von Gerhard. Von Dem Busch, D.M., et Chir., &c. Stockholm, 1852. 8vo. Seite 574.

The Fever at Bona Vista in 1845–46, unconnected with the visit of the Eclair to that Island. By Gilbert King, M.D., R.N., Inspector of Hospitals and Fleets. London, 1852. 8vo. Pp. 110.

Stricture of the Urethra; its Complications and Effects; with Practical Observations on its Causes, Symptoms, and Treatment, and on a Safe and Efficient Mode of Treating its more Intractable Forms. By Robert Wade, F.R.C.S., Senior Surgeon to the Westminster General Dispensary, Fellow of the R. Med. and Chir. Soc., &c. London, 1853. 8vo. Pp. 360.

Clinical Reports on Ovarian and Uterine Diseases, with Commentaries. By Robert Lee, M.D., F.R.S., Fellow of the R. C. Physicians, London; Physician to the British Lying-in Hospital and St Marylebone Infirmary, &c. London, 1853. 12mo. Pp. 340.

Pulmonary Consumption, and its Treatment. By Willoughby Marshall Burslem, M.D., Licentiate of the R. C. of Physicians, Senior Physician to the Blenheim Dispensary. London, 1852. 8vo. Pp. 160.

Observations on the Treatment of Lateral Curvature of the Spine, &c., with Woodcuts. By Edward F. Lonsdale, F.R.C. Surgeons, Surgeon to the Royal Orthopaedic Hospital. 2d Ed. London, 1852. 8vo. Pp. 127.

A Treatise on Corns, Bunions, and Ingrowing of the Toe-Nail; their Cause and Treatment. By T. J. Ashton, Surgeon to the Blenheim Dispensary, Formerly House-Surgeon at University College Hospital, &c. London, 1852. Post 8vo. Pp. 82.

Facts and Observations on the Physical Education of Children, especially as regards the Prevention of Spinal and other Deformities. By Samuel Hare, F. of the R. C. Surgeons, &c. London, 1852. Post 8vo. Pp. 71.

A Practical Treatise on Inflammation of the Uterus, its Cervix and Appendages, and on its Connection with Uterine Disease. By James Henry Bennet, M.D., Member of the R. C. of Physicians, &c. Third Edition. London, 1853. 8vo. Pp. 532.

Moral Sanatory Economy. By Henry M'Cormack, M.D., Consulting Physician to the Belfast General Hospital, Visiting Physician to the District Asylum for the Insane, &c. London, 1853. 12mo. Pp. 150.

Syphilitic Diseases; their Pathology, Diagnosis, and Treatment, including Experimental Researches on Inoculation as a Differential Agent in Testing the Character of these Affections. By John C. Egan, M.D., M.R.I.A., Fellow and Licentiate of the Royal College of Surgeons in Ireland, &c. &c. London, 1853. 8vo. Pp. 339.

The Dictionary of Domestic Medicine and Household Surgery. By Spencer Thomson, M.D., L.R.C.S., Edin. Part xii. London, 1852.

A Dictionary of Practical Medicine. By James Copland, M.D., F.R.S., Fellow of the Royal College of Physicians, &c., &c. London, 1852. Part Sixteenth; being Part VII. of Volume III., pp. 865–1008.

The British and Foreign Medico-Chirurgical Review, or Quarterly Journal of Practical Medicine and Surgery. No. xx. October 1852.

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2. The Nature and Cure of Consumption, Indigestion, Scrofula, and Nervous Affections. By G. CALVERT HOLLAND, M.D.

3. Practical Suggestions for the Prevention of Consumption. By G. CALVERT HOLLAND, M.D.

4. A Practical Synopsis of Diseases of the Chest and Air-Pas-

sages: with a Review of the several Climates recommended in these Affections. By James Bright, M.D.
5. The Nature, Symptoms, and Treatment of Consumption, being the Essay to which was awarded the Fothergillian Gold Medal, by the Medical Society of London. By Richard Payne Cotton, M.D.
6. A Treatise on Tuberculosis, the Constitutional Origin of Consumption and Scrofula. By Henry Ancell, late Surgeon to the Western General Dispensary.
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8. The Spirometer, the Stethoscope, and Scale-Balance; their use in discriminating Diseases of the Chest, and their value in Life Offices; with Remarks on the Selection of Lives for Life Assurance Companies. By John Hutchinson, M.D.
II.—1. On the Nature and Treatment of Diseases of the Kidney connected with Albuminous Urine (Morbus Brightii). By G. Owen Rees, M.D., F.R.S.
2. The Pathology of the Kidney in Scarlatina. Illustrated by Cases. By James Miller, M.D.
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Appendix to the Treatise on the Structure, Diseases, and Injuries of the Bloodvessels. With Statistical Deductions. By Edwards Crisp, M.D., Physician to the Metropolitan Dispensary, &c. London, 1851. 8vo. Pp. 40, 358–398.

On Perforating Ulcer of the Stomach from Non-Malignant Disease. Part I. By Edwards Crisp, M.D., Physician to the Metropolitan Dispensary. London, 1852. 8vo. Pp. 22.

Letter to the Right Honourable the Earl of Shaftesbury, containing suggestions as to the expediency of submitting certain branches of Trade and Manufactures to Government Medical Inspection. By J. B. Harrison, M.R.C.S., &c., &c. Manchester, 1851. Pp. 13. 8vo.

The Modern Practice of Physic: Exhibiting the Symptoms, Causes, Prognostics, Morbid Appearances, and Treatment of the Diseases of all Climates. By Robert Thomas, M.D. Eleventh Edition; thoroughly Revised, Corrected, and to a considerable extent re-written. By Algernon Frampton, M.D., Cantab. Physician to the London Hospital. In Two Volumes. London, 1853. 8vo. Vol. I., pp. 755. Vol. II., pp. 564.

A Treatise on Operative Ophthalmic Surgery. By H. Haynes Walton, Fellow of the R. C. of Surgeons, England, Surgeon to the Central London Ophthalmic Hospital, and Assistant Surgeon to St Mary's Hospital. London, 1853. 8vo. Pp. 628.

The Right of Marischal College and University, Aberdeen, to confer Degrees, not only in Arts, as admitted, but in Divinity, Laws, and Medicine; Vindicated against the Attacks of the Responsible Administrators of King's College and University, Old Aberdeen, and shewn to have been affirmed, more than a hundred years ago, by the House of Lords, as the Supreme Court of Appeal, under the instructions of Lord Hardwicke. By one of the Professors. Aberdeen, Edinburgh, Glasgow, London, 1853. 8vo. Pp. 55.

A Treatise on Auscultation and Percussion. By Dr Joseph Skoda. Translated from the Fourth Edition. By W. O. Markham, M.D., Assistant-Physician to St Mary's Hospital. London, 1853. Post 12mo. Pp. 346.

Observations on Syphilis and on Inoculation, as the Means of Diagnosis in Ulcers and Discharges invading the Genital Organs; Comprising also a Brief Outline of the Ancient and Modern Treatment of Syphilis, and pointing to New Views and to a New Method of treating that Disease. By John Crouch Christopher, M.R.C.S. London, 1853. 8vo. Pp. 74.

Six Lectures on Materia Medica, and its Relations to the Animal Economy; Delivered before the Royal College of Physicians in 1852. By John Spurgin, F.C.P.S., and Fellow of the College. London, 1853. Pp. 204.

Atlas of the Formation of the Human Body in the Earliest Stages of its Development. Compiled from the Researches of the late Professor, Dr M. P. Erdl. By Joseph Kahn, M.D., Vienna. Illustrated by Sixty Figures contained in Thirteen Plates. London, 1852. 4to. Pp. 29.

Lumleian Lectures, 1852. On the Effects of Lead upon the System, and on the mode in which water is rendered impure by the presence of Lead. By James Alderson, M.D., F.R.S. Delivered at the Royal College of Physicians. (Reprinted from the *Lancet*, Vol. II., 1852.) London, 1852. 4to. Pp. 19.

Sanitary Measures and their Results; Being a Sequel to the History of Cholera in Exeter, in 1832. By Thomas Shapter, M.D., Physician to the Devon and Exeter Hospital; to St Thomas's Hospital, near Exeter, for Lunatics; the Lying-In Charity, &c. London, 1853. 8vo. Pp. 32.

Urinary Deposits; their Diagnosis, Pathology, and Therapeutical Indications. By Golding Bird, A.M., M.D., F.R.S., F.L.S., Fellow of the R.C. of Physicians, &c.; Assistant Physician and Lecturer on Materia Medica and Therapeutics at Guy's Hospital. Fourth Edition. Revised and Enlarged. London, 1853. Post 8vo. Pp. 473.

The Dissector's Manual of Practical and Surgical Anatomy. By Erasmus Wilson, F.R.S. Second Edition. Illustrated with Wood Engravings. London, 1853. 12mo. Pp. 626.

On Diseases of Women and Ovarian Inflammation, in Relation to Morbid Menstruation, Sterility, Pelvic Tumours, and Affections of the Womb. By Edward John Till, M.D., Senior Physician to the Farringdon General Dispensary, and to the Paddington Free Dispensary for Diseases of Women and Children, &c. &c. Second Edition. London, 1853. 8vo. Pp. 276.

On the Pathology and Treatment of Hysteria. By Robert Brudenell Carter, Member of the Royal College of Surgeons of England. London, 1853. Post 8vo. Pp. 161.

Permanent Cure of Reducible Hernia. By George Hayward, M.D., of Boston. Illustrated. Philadelphia, 1852. 8vo. Pp. 25.

Hysterical and Nervous Affections of Women. Read before the Harveian Society. By William John Anderson, F.R.C.S., Honorary Secretary to the Society, &c. London, 1853. 12mo. Pp. 39.

On Near Sight, Aged Sight, Impaired Vision, and the Means of assisting Sight. By William White Cooper, F.R.C.S.E., 'Ophthalmic Surgeon to St Mary's Hospital, &c., &c. Second Edition. London, 1853. Post 8vo. Pp. 320.

An Account of Yellow Fever, as it occurred on Board the R. M. S. Ship La Plata, in November 1852. By John Webb, Esq., F.R.C.S., &c., and Alexander Harvey, M.D., Edinburgh, &c., &c. London, 1853. 12mo. Pp. 23.

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The Dublin Quarterly Journal of Medical Sciences. No. XXIX. February 1853.

The American Journal of the Medical Sciences. No. XLIX. N. S. January 1853.

Weekly Returns of Births and Deaths in London. No. I. Week ending 1st January to No. XII. Week ending 19th March.

The Tenth Report of the Registrar-General for 1847; and Eleventh Report of Registrar-General for 1848.

Half-Yearly Abstract of Medical Sciences. Volume XVI. July to December 1852. Edited by Dr Rankine and Dr Redcliffe.

THE
EDINBURGH
MEDICAL AND SURGICAL JOURNAL.
1st JANUARY 1853.

PART I.

ORIGINAL COMMUNICATIONS.

Art. I.—*The Literature of* STAPHYLOMA *of the Cornea, presented agreeably to the present state of knowledge.* By W. Roser, Professor of Surgery in Marburg.

Introduction.

Staphyloma, in German Polterauge, one of the most remarkable of the anciently known diseases of the eye, is an affection of the anterior, and indeed the most anterior part of the eye; and though it is an affection attended with very great and manifest changes, it is hitherto a subject of manifold doubts upon its anatomical structure, and upon the mechanism of its formation. In a disease, which is so common, and which by reason of its situation is so accessible to direct observation, this ought not to be expected. It is natural, therefore, to feel the urgency of the question, whether it is because Nature has placed peculiar difficulties in the way of medical observation, that she has proposed a very peculiar enigma for solution.

It would be unpleasant to conclude that this is the case. The multiplicity of mechanical operations and conditions which in Staphyloma come under consideration, is very great; and any one to whom this multiplicity has been hitherto less striking, may, by means of the view given in the following Essay upon this complicated subject, convince himself of the difficulties of the inquiry. On the other side, it is not to be denied, that the incompleteness of our knowledge of STAPHYLOMA, must be a subject of reproach to ophthalmological writers. Many ophthalmologists, and especially those of what is named the German School, have resigned themselves to a convenient authoritative creed, and a hurtful satisfaction; they have neither exercised criticism upon the current ontological suppositions, nor shewn inquiry and observation, where occasion for anatomical elucidation was given. They have in general neglected pathological anatomy. While Anatomists, as Andral, Rokitanski, and others, have left the investigation of the morbid eye to professed ophthalmologists, the latter committed the error of overlooking almost entirely what was left to them. Such negligence could not fail to have injurious consequences. It caused that the treatment of diseases of the eye has been left behind the other branches of practical medicine, and that at the present time we must make great efforts to repair the deficiency.

But what might have withheld ophthalmologists from devoting their attention to the pathological anatomy of the eye, and elucidating the diseases of the organ of vision by the light of pathological anatomy? The answer may be given; The opportunities of dissecting morbid eyes are given with comparative rarity; and only few persons are in the position to make a great number of dissections of this nature. This is in general correct; meanwhile the only conclusion which hence follows, is, that observers should so much the more industriously avail themselves of these more rare occasions; and that these few persons should so much more zealously employ the necessary opportunities. It is further only too well known, that these opportunities happen not conveniently. Anatomists in Paris, in the times of Broussais and Andral, dissected all the organs with the most zealous diligence; the eye only they neglected. Anatomists in Vienna have in all parts of pathological anatomy discovered something new, except in the eye; and the Charité at Berlin has produced for the pathological anatomy of the eye as little profitable information as the General Hospital at Vienna.

Thus might it happen that inflammation of the Choroid Coat, the disease which at the present time is of all causes of incurable blindness the most important, remains unknown to the greatest part of physicians; that inflammation of the Ciliary Body came to be known only of late years; that the theory of Capsular Cataract was first rectified by Malgaigne; that the causes of Glaucomatous turbidity were so long in obscurity; and lastly, not to refer to very remote matter, and coming to the subject of the present essay, that the theory of Staphyloma has fallen, as Walther says, into a true Chaotic Disorder, and at the present time is almost in no book represented in any other manner.

With the neglect of anatomy on the part of oculists stands in intimate connection, that ontological mode of viewing the subject, that dependence on the old conceptions of disease and forms of disease, by which originally was the greatest inclination to assume the traditional dogma; and to find the same established in nature. Ontology accordingly presents the correctness of the morbid form of STAPHYLOMA, that is the existence of one perfectly definite disease under this name, and proposes the following question:—What is the essential character of Staphyloma? With the proposition of this question the whole investigation was placed in the path of error. Instead of thus putting the question, the inquirer ought to have investigated, altogether without preconception, by what mechanism protrusions of the anterior part of the pupil were effected, to what anatomical peculiarities these protrusions belong, and what differences are thereby observed to take place.

The following pages ought to prove, to what extent this more recent amended form of stating the question may lead to greater clearness and perspicuity upon a difficult subject.

SECTION FIRST.

THE FORMS AND MODES OF STAPHYLOMATOUS PROTRUSIONS ON THE CORNEA.

§ I. THE NEW THEORY OF WHARTON JONES.

An obscure and uneasy idea, as if of inextricable confusion, must have arisen in the mind of any person, when he sought in authors for the explanation of the mechanism of STAPHYLOMA, and when he compared what is written in books with that which is observed in the persons of patients. The more thankful ought we to be to any one who should put an end to this confusion. In the first rank in this respect Mr Wharton Jones deserves to be placed. In the year 1838,[1] he made known the fact, that the change which is called STAPHYLOMA CORNEAE, is nothing else than a prolapsus of the iris, covered by a cicatrized false membrane; that consequently

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[1] London Medical Gazette, 1838, p. 847; the article Cornea by W. Jones in Cyclopædia of Practical Surgery, 1841, p. 842; and Ophthalmic Medicine, by W. Jones. London, 1847, p. 189.

Staphyloma consists not in a morbidly changed cornea, but is something newly formed, a species of false membrane, in short a *Pseudo-cornea.*

The new doctrine of a Pseudo-cornea was partly adopted, in part, probably independently, afterwards discovered by Tyrrell,[1] Mackenzie,[2] Hawranek,[3] Arlt,[4] Hasner,[5] Frerichs,[6] Sichel,[7] and several other observers. STAPHYLOMA arises when the Iris is exposed by a large loss of substance in the Cornea, when the pupil is forthwith closed, the accumulation of watery fluid in the posterior chamber proceeds anew, and in consequence of the augmentation of the fluid of the posterior chamber, the Iris is thrust forwards. The exposed Iris becomes covered by a species of false membrane, and at the margin of the Cornea, or at the margins of the remains of the Cornea, the Iris and Cornea are so united by the organizing exudation which is covered with epithelium, that the observer can no longer properly distinguish the limits of the two textures. The protrusion is, from its arched shape and its smooth shining surface, so like an opake Cornea, that oculists in general regarded it as such, and that we can scarcely apply to it any better name than that of *Pseudo-cornea,* selected by Mr Wharton Jones.

However manifest may be the correctness of the discovery made by Mr Wharton Jones, in the view of every one who has any experience in this matter, yet, with good grounds, doubts concerning the general validity of the new theory, may be started; and it must still be a subject of inquiry, whether the old theories, proposed by Richter and Beer, are not probable in part of the cases, or are only exceptionally correct; in other words, whether Staphylomatous Protrusions do not take place, which are formed according to the mode of origin represented by Richter and Beer.

§ II. THEORY OF RICHTER.

According to Richter the Cornea must be affected with an inflammatory swelling and thickening in order that the Staphylomatous Protrusion should take place[8]. STAPHYLOMA he describes as a soft white mass of the consistence of lard. At a subsequent period this often becomes hardened.

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[1] Tyrrell on the Eye. London, 1840, p. 269.

[2] A Practical Treatise on the Diseases of the Eye. By William Mackenzie, M.D., &c. Third Edition. London, 1840. 8vo. Section xiv., p. 569.

[3] Oesterreiche Wochenschrift, 1844, p. 1127, and 1847, Nos. 34, 35.

[4] Nott Prages Zeitschrift, 1844, vol. ii., s. 79.

[5] Hasner Anatomische Begrundung der Augenkrankheiten, 1847, seite 141.

[6] Frerichs Hannov. Annalen, 1847, seite 428.

[7] Sichel Archives Generales, 1847, Juli und August.

[8] Anfangsgrunde der Augenkrankeiten, Band iii., 1790, p. 176.

By Ph. Walther the view of Richter was expanded and maintained with great zeal; and many, though not for the most part unconditionally, adopted the view that thickening of the Cornea is the cause of STAPHYLOMA. Walther designates the disease as a hypertrophy and increase of substance of the Cornea; and he regards it as similar to the hypertrophy of the toe-nail, which is named Fools-nail; (Narrennagel).

A view of this kind could not easily be maintained and defended by men so eminent, were there not some matter-of-fact at its foundation. This matter-of-fact element, however, is the, in many instances actual, very considerable thickening, which at an early period was referred to the Cornea, and at present is known as an adventitious texture; the Pseudo-Cornea. Many observers adduced the observation, that in cutting off many instances of Staphyloma no fluid escapes, but that the Cornea knife carried through the base of the protrusion, brought to view only solid substance. Such observations ought nearly to suggest the idea that there are cases of STAPHYLOMA by thickening, in which no part is performed by pressure of Aqueous Humour. Of this opinion are many at the present time; and it may be maintained that this view, though it is not founded on anatomical evidence, still has all pretensions in its favour.[1]

Already had Richter admitted, that there might occur forms of STAPHYLOMA, which might be produced by attenuation of the Cornea, in consequence of enlargement of the chamber of the eye. To this proposition Scarpa[2] gave further extension, in so far as he promulgated the doctrine, that there are two forms of STAPHYLOMA, one set which arise from increase of substance of the Cornea, the other from extension of this tunic. The first forms are in a particular manner those met with in children. The doctrine of Scarpa was adopted especially in Berlin, and hence we observe the oculists of the Berlin School, namely, Graefe, Jungken, Andreae, Ammon, professing the view that one part of cases of Staphyloma depend on Hypertrophy, Growth, Thickening of the Cornea, namely, the cases of *Thickening-Staphyloma* (according to Andreae, or Adhesion-Staphyloma according to Graefe); that another division of these protrusions, on the contrary, are produced by Extension, Thinning, Compression of the Cornea, namely, the *Extension-Staphyloma.*

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[1] Compare what is said at §§ 19 and 20 afterwards.

[2] Scarpa on Diseases of the Eye. Translated by J. H. Wishart.

As to the diagnosis of Staphyloma by Thickening, the observer may form the conjecture, that those protrusions which possess greatest resistance and little tendency to strong or rapid growth, may belong to the form of *Staphyloma* by Thickening.

§ III. THEORY OF BEER.

Beer, like Scarpa, admits the existence of two different forms of STAPHYLOMA; one with extension in consequence of the presence of fluid; the other without fluid, or with obliteration of the chambers of the eye. Of the last, to which Beer applies the name of *Staphyloma conicum totale,* we shall subsequently speak.

To Beer belongs the merit of having explained, though not correctly, the important part which the Iris performs in the formation of *Staphyloma.* Beer taught that the essential circumstance of *Staphyloma* depends on the anterior adhesion between the Iris and the Cornea, and on the common protrusion of the two mutually adherent membranes, the Cornea and the tunic of the Iris. To this, he added, if the Cornea be an absorbing organ for the aqueous humour, this absorption must be prevented by the agglutination of the Iris to the Cornea; and hence, after such agglutination, the accumulation of the fluid of the posterior chamber of the eye, with staphylomatous protrusion of the anterior membranes, would be produced.

If against this theory the objection be urged, that equally the most trifling, the most acute, the largest cases of *Staphyloma,* the instances of Total Staphyloma, in which the Cornea is entirely destroyed, are placed under it; it, nevertheless, does not hence follow, that the Mechanism imagined by Beer is absolutely false, and admits not of application. It must rather be admitted, that in many instances of Partial *Staphyloma,* something of the sort takes place. We behold not unfrequently conical protrusions of the Cornea with the Iris, which, as it appears, have their origin in adhesion of the entire pupillary margin, with a comparatively small perforated spot of the Cornea. The Iris blocks up the hole which has taken place in the Cornea; the pupil is united to it and is closed; there ensues seclusion of the posterior chamber of the eye from the anterior, which is emptied by the perforation; and the Cornea and Iris together are distended and thrust forward by the fluid of the posterior chamber.

This would be nearly a case of formation of Staphyloma according to the ancient theory of Beer. It wants only the complete agglutination of the Cornea and Iris assumed in the old theory, because both these membranes are agglutinated with each other only at one spot, namely, corresponding to the pupillary margin; the circumference, though also attached, is however not adherent.[1] Whether exceptions from this are observed, whether there occur also instances of *Staphyloma*, in which the Cornea and Iris are mutually agglutinated to greater extent, in which consequently the mechanism imagined by Beer is found fully confirmed, is a point which appears not yet to be sufficiently investigated. To me it has become probable, that in an exceptional manner such instances of Staphyloma, as described by Beer, take place; and it appears to me, particularly in those instances in which an incipient Partial *Staphyloma* is developed to the degree of Total *Staphyloma*, a complete adhesion of the Iris with the yet present portions of the Cornea begins to take place. I saw, for example, on one occasion a Partial *Staphyloma* produced by *Hypopyon;* and when I again saw the patient after the lapse of some weeks, there was formed a Total *Staphyloma*, in which no remains of transparent Cornea, allowing the Iris to appear through its substance, could be distinguished. In several instances of Total Staphyloma, which I first saw after complete development, it appeared to me probable that the disease at first had been only in the form of Partial *Staphyloma*, but had taken a further development to the degree of Total *Staphyloma*, and that consequently in the beginning only the affected parts, that is, the Cornea and Iris, might be agglutinated by their surfaces.[2]

When the partial anterior *Synechia*, for instance, the *Synechia* of the entire margin of the pupil, which has brought with it prolapsus of the Iris, has in the progress of inflammation, or in the course of new attacks of this process, proceeded to the degree of Total *Synechia*, and consequently the Iris and Cornea are protruded simultaneously, a form of morbid appearance altogether similar may be produced, as in the ordinary Total *Staphyloma*. Such a case, however, of originally Partial *Staphyloma* ought, according to anatomical investigation, to be capable of being distinguished from primary Staphyloma, by the presence of the membrane of Descemet, and by the Cornea fibres cognizable by the microscope.

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[1] See Hasner, p. 147–148, and the Essay of Franz Chelius, Heidelberg, 1847, p. 24. Beer had already represented the mechanism of Partial *Staphyloma* in this manner; he has, consequently, only in reference to Total Staphyloma delivered an erroneous doctrine. Augenkrankheiten, Band ii., seite 71.

[2] Chelius ii., p. 383, speaks in the following terms: "We observe during the development of Conical *Staphyloma*, that the part of the Cornea which is still unaffected, possesses some lustre and transparency, lies close to the protruded Iris; but that, as a consequence of continuing inflammation, the adhesion prolongs this appearance over the whole circumference." Desmarres expresses himself to the same effect.

§ IV. PROLAPSUS OF THE IRIS AND PARTIAL STAPHYLOMA.

What constitutes then the difference between a simple ordinary prolapse of the Iris and a Partial Staphyloma? Where lies the limit between the two, if in general such a limit exists? The question may probably receive an answer in the following manner. A perfectly well-marked boundary does not exist. We observe transition stages. But prolapsus of the Iris we call those protrusions, in which the Iris is protruded only by one perforation in the Cornea, and where a more evident limit between the Iris and the Cornea may be observed. The name STAPHYLOMA we apply to those cases in which the Iris and Cornea are at spots of protrusion confounded with each other, and together form the protrusion, while also the still transparent portion of the Cornea is conically arched.

Several authors, for instance Walther and Beer, wish not to apply the denomination of STAPHYLOMA to the instances of small Partial Staphyloma, that is prolapse of the Iris, in which the anterior chamber is still preserved, but think it should be separated under the names of projecting *Leucoma*, Pearl-spot, *Leucoma Margaritaceum*, or Nail-head, *Clavus*, &c. To dispute about this would be altogether useless. It is sufficient to make clear the difference between a Partial Staphyloma with Synechia of the entire margin of the pupil, and the same affection with only partial adhesion of the pupil. What name may be applied to the latter morbid affection is, in an anatomical point of view, of very slender importance.

§ V. PARTIAL STAPHYLOMA AND TOTAL STAPHYLOMA.

It is understood that between partial and general Staphyloma a transition takes place. On the boundary line are placed those instances in which a small relic of Cornea, probably only a small slip of the tunic, remains, without being entirely, in the protrusion, dissolved in the mass, which is distinctly separated by its turbidity and colour. But to the idea of Total *Staphyloma* a very different extension is given. Some call those only cases of Total Staphyloma in which the whole protrusion presents the formation of a *Pseudo-cornea,* after loss of the Cornea. The cases, in which a transparent portion of the Cornea, however covered in the protrusion, allows itself still to be perceived, are then named Partial *Staphyloma.* Others arrange the last mentioned cases with those of Total *Staphyloma,* and distinguish as Partial *Staphyloma* those cases in which a protrusion has been developed upon the Cornea. Practically considered, we may distinguish the three following stages or degrees.

1. The complete *Pseudo-cornea,* the cure of which usually consists in removal.
2. The incomplete *Pseudo-cornea,* with persistence of a relic of transparent Cornea, but with such complete *Synechia* of the margin of the pupil, that vision is possible only after the formation of an artificial pupil.
3. The mere partial protrusion with distortion of the pupil, by which probably, on account of the leucomatous turbidity of the morbid part, the operation for irregular pupil may be indicated.

§ VI. CONICAL AND SPHERICAL STAPHYLOMA.

The most decided spherical form of *Staphyloma* we usually see arising in circumstances in which the Cornea is entirely destroyed, and in which the Iris is immediately covered by a broad strong expanded Pseudo-cornea. The most decided conical figure appears to be formed in those cases, in which a central perforation of the Cornea had produced the adhesion of the entire pupillary margin, with a combination of closure of the pupil with *Synechia* of the anterior margin. It is easily understood how in the latter case the central portion, the Pseudo-cornea, in a particular manner, is protruded; how it affords less resistance to the pressure of the fluid of the posterior chamber, than the portion which is still healthy, namely, that part of the Cornea next to the circumference of the tunic, and accordingly by what means the conical figure takes place.

In general, cases of Partial *Staphyloma* have a conical shape, while cases of Total *Staphyloma* have the spherical figure. We, however, meet with cases of small Partial *Staphyloma,* cases of prolapse of the Iris, of uniform round figure, and instances of large Total Staphyloma, the shape of which is conical. The conical shape of the cases of Total Staphyloma might partly be accounted for in this manner, that the Sclerotic coat is drawn in along with it, but is less easily expanded than the Pseudo-cornea on its boundaries. Probably they are derived in part also from protrusion of the lens towards the Pseudo-cornea, or from enlargement of the Pseudo-cornea.[1] Hasner deduces[2] the conical shape of many instances of partial Staphyloma from this circumstance, that a large blennorrhœal ulcer has induced thinness of the Cornea, and this ulcer has proceeded in its centre to perforation; forthwith prolapsus of the Iris takes place, and around this must arise protrusion of the attenuated Cornea. As complete proof, this explanation of the conical shape from the attenuation of the Cornea ought not to be valid, because, in general, a protrusion of the Cornea, attenuated by ulceration, is observed only in exceptional cases (*Keratocele*[3]), and because frequently instances of small prolapsus of the Iris are observed at the base of large ulcers of the Cornea, without protrusion taking place around the prolapsus of the Iris.

§ VII. THE CONICAL COMPLETE STAPHYLOMA OF BEER.

Under the name of Conical Total STAPHYLOMA is described by Beer,[4] Rosas, Walther, and other writers, a modification of Staphylomatous formation, which certainly has its foundation in no other circumstance than a degree of *Choroiditis* attending Staphyloma. The exudation of the choroid coat presses forwards; we observe from this cause a displacement of the lens forwards, from which result wasting of the chambers of the eye, and adhesion of the capsule of the lens with the Iris and Cornea (*Pseudo-cornea*); the conical shape of the protruding Cornea attacks also the sclerotic coat; and the symptoms of deep-seated disease in the eye are established. It is clear that the whole mechanism of this form of

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[1] Szokalski makes the following remark. "In a case of Conical Staphyloma which I examined anatomically, it was found that the capsule was gone with its Lens, and the Cornea at the apex of the Staphylomatous funnel was distinctly thicker than in the vicinity of its junction with the Cornea."—Archiv fur Physiol. Heilkunde, 1846, seite 192.

[2] *Loco citato*, s. 147.

[3] This sort of protrusion I have never seen. Chelius (Augenheilkunde, ii. seite 178) says the same thing.

[4] Abbildung bei Beer. Band II. Tafel ii., fig. 5. I say expressly the Conical Total Staphyloma of Beer, because under this name other writers describe other conditions. Thus Wharton Jones in his Ophthalmic Medicine, p. 195, describes a complicated case of Hydrophthalmus.

Staphyloma acquires a peculiar character from the exudation from the choroid coat, and by reason of the posterior *Synechia.* More recent observations upon this subject are still wanting in the literature of ophthalmic diseases.[1] A case observed by me, which appeared exactly as Beer's figure, gave after operation the result, that behind the conical, spongy, soft, but thick-walled protrusion removed close to its base, appeared a collection of purulent matter, which quite evidently came from within and behind the depth of the eye.

That all instances of Conical Total Staphyloma must be connected with adhesive obliteration of the posterior chamber of the eye, and inflammation of the posterior basis of the eye, cannot be admitted unconditionally, and is not required by the school of Beer. Further, it is not a matter of doubt, that instances of Conical Staphyloma take place with dropsy of the posterior chamber. Upon this subject Chelius particularly has made some observations deserving attention.

§ VIII. STAPHYLOMA OF THE CILIARY BODY.

The affection called STAPHYLOMA of the Ciliary Body must be introduced in this place under the head of *Staphyloma* of the Cornea, because it in many instances appears as a mere propagation of Staphyloma of the Cornea. When the posterior chamber in the formation of Staphyloma is distended, and probably the coloured Pseudo-cornea shews itself less easily extensible than the anterior part of the sclerotic coat, then the dropsy of the posterior chamber thrusts out the sclerotic coat in a lateral direction.

That this condition must take place in the manner mentioned, several authors, for instance Chelius, appear to have made clear. But the formal anatomical proof of the fact is furnished by the dissections of Arlt, who uses the following language. "These bluish tubercles lie, as dissections have taught me, always on this side, that is anterior to the Ciliary Body. They always denote increased accumulation of the Aqueous Humor, or true Dropsy of the Posterior Chamber."

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[1] Arlt's communications (Augenkrankheiten i., p. 262), are somewhat indistinct. He speaks of a dropsical state of the vitreous lens, produced by laceration of the vitreous tunic, by reason of pressure from the muscles of the eye, which carries with it the symptoms of Staphyloma with *varicositas Bulbi*, Palsy of the Retina, &c. It is impossible to discover from the account of the author whether his views rest upon the evidence of observations, or whether they may be a consequence of the theories of the author upon muscular pressure as a cause of Staphylomatous protrusions.

§ IX. STAPHYLOMA RACEMOSUM.

This name has been given to those protrusions which, like the bramble-berry, appear to be composed of several individual parts. Pathologists originally explained the formation of this form of ophthalmic disease, by supposing the occurrence of manifold Prolapsus of the Iris, subsequent to perforation of the cornea in several points at the same time. Of a different opinion are Arlt and Hasner. According to Hassner, *Staphyloma racemosum* consists " only in one irregular protrusion of the prolapsed Iris, produced by irregular thickness and resistance of the pseudo-membranous structure." " There are formed fibres which stretch from one edge of the ulcer to the other, and progressively form a net-work, in the interstitial spaces of which often considerable protrusions of the Iris are observed."

According to cases communicated by Arlt and Hasner,[1] no objection can be urged against the correctness of this mechanism directly observed by them. I have also seen cases which confirmed me in the same view. On the other hand, in another class of cases, the earlier view of the manifold prolapsus of the Iris may be well founded, and, consequently, there may exist two different modes in which this form of *Staphyloma racemosum* may be produced.

§ X. PSEUDO-STAPHYLOMA.

There are conditions which may be often alternated with Staphyloma,—cases of anterior dropsy of the eye, with protrusion and opacity of the cornea. These we would name PSEUDO-STAPHYLOMA. When the affection denominated *Staphyloma pellucidum*, conical or spherical, becomes inflamed, and the cornea is thereby rendered perfectly opake, such a case of *Pseudo-staphyloma* takes place. A cornea which has become opake in this manner, may be very similar to the Pseudo-cornea of a small Total Staphyloma.[2] Still greater must be the similitude, if, after the death of a large patch of the superficial layer of the cornea, this tunic may be pressed forwards and covered by an epithelial layer arising from exudation. A protrusion of the cornea in *Hypopyon* Ammon refers to the head of Staphyloma, and he gives a figure of an eye of this kind from a new-born child in his Clinical Representations.[1]

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[1] See Arlt Prager Zeitschrift, ii., 1844, seite 40; and Hasner, Entwurf, &c., p. 145.

[2] Frerichs, *loc. cit.*, seite 429. Ammon Klinische Darstellungen Dritter Theil, Tafel vi., fig. 1–8.

In some experiments on rabbits, which I performed ten years ago, I observed occur great distension of the Cornea, protruded by a collection of blood or purulent matter. These cases were sufficiently similar to a genuine Staphyloma formation produced by the induction of a Pseudo-cornea. As I witnessed the protrusion, after entire removal of the Iris (*Irido-dialysis*), take place in the same manner, this circumstance led me to the idea, that the Iris is, in the formation of Staphyloma, not an essential element, and that the ordinary Staphyloma consists only in protrusion of the opake diseased Cornea. I consequently gave this representation of the matter in my System of Anatomical Chirurgery. (Tubingen, 1843. P. 59.) The view is, however, incorrect. The same view is also expressed by the oculist, A. Berard, in the Dictionnaire de Médecine. (Tome xxviii. Paris, 1844.)

Andreae employs the following language. "This very rare form I have several times observed, and particularly after Blennorrhœa; and I can prove by dissection, that no adhesion of the Iris with the cornea takes place."[2] In Ammon's Journal of Ophthalmologie, Henschel communicates a case,[3] in which, notwithstanding the congenital absence of the Iris, a Total Staphyloma must have been developed. Ruete[4] mentions an instance of conical Partial Staphyloma, in which the Iris was evidently completely free from disease. Further references appear to be unnecessary. All forms of disease of this kind might be most conveniently designated by the name of Pseudo-staphyloma.

Hasner describes a variety of *Keratocele*,[5] which, when it actually exists, may be most accurately arranged with the Pseudo-staphylomatous forms. According to Hasner, it must not unfrequently happen, that an affection, which, in the beginning, is an ulcer of the Cornea with a small perforating opening, may have for its consequences the evacuation of the chambers of the eye, the agglutination of the Iris to the cornea, and the protrusion of both membranes together in the shape of a blackish prominent membrane. This condition, Hasner describes in the following manner. "Very readily there occurs in this seat of ulcer of the Cornea an illusion, in so far as the observer, in consequence of the transparent blackish Iris colour which it has, takes for a case of Prolapsus of the Iris, the protruded attenuated lamellæ of the cornea, which often shew an opening scarcely the size of the point of a needle, through which the aqueous humour is discharged, while the Iris in such a case is still contained within the chamber of the eye." "Should an ulcer of this kind be healed, then often the chamber of the eye may be completely restored; yea, the Iris, which, at an early period, apparently formed a large protrusion, is drawn either entirely back, or there remains only a very trifling posterior *Synechia*, by no means corresponding with the size of the Prolapsus." "It is then believed that the cornea has been regenerated; this, however, is not the fact." The phenomena, which are here described by Hasner, appear not hitherto to have been observed by other ophthalmologists. I find, in the literature of the science, only one notice by Ruete, upon Keratocele with *Prolapsus Iridis*, which has any correspondence with it.[1] Should the observation of Hasner be established, then the remarkable subject may be elucidated, that, in former periods of ophthalmology, all observers had mistaken for Iris, something which was not Iris, but Cornea; as the converse was shewn by Wharton Jones, that all early observers had mistaken, for Cornea, something which was not Cornea, but Iris, namely, the Iris exchanged for Pseudo-cornea.

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[1] Ammon Klinische Darstellungen Erster Theil, Tafel vi., fig. 1.

[2] Grundriss der Augenheilkunde. Leipzig, 1846. Band ii., seite 454.

[3] *Loco citato*, tome i., seite 52.

[4] Klinische Beitrage, heft i., seite 60.

[5] Anatomische Begrundung, seite 146, 147.

§ XI. VIEW OF THE FORMS REFERRED TO STAPHYLOMA OPACIUM.

We establish, accordingly, the following different anatomical formations, which, hitherto, for the most part, have been confounded and mingled together, and the mechanism of which, consequently, has not been understood by the most of physicians.

1. The Perfect Pseudo-cornea, with the following principal Variations.

a. Dropsy of the Posterior Chamber; Pseudo-cornea expanded, and in general attenuated; the usual spherical Total Staphyloma. When the sclerotic coat is particularly protruded by the presence of fluid, the affection is called Staphyloma of the Ciliary Body. When the Pseudo-cornea presents manifold elevations, the affection is named *Staphyloma racemosum*.

b. Adhesion of the Posterior Chamber; Thickened Pseudo-cornea; *Staphyloma* by Thickening. This is wont to take place, particularly in children. If the exudation from the choroid coat is present, with adhesion of the posterior chamber, we then have the Conical Total Staphyloma of Beer.

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[1] Ophthalmologie, seite 418.

2. The Partial Pseudo-Cornea; Partial Staphyloma.

a. With arching of the Cornea in the circumference of the Pseudo-cornea; transition to Total Staphyloma.

b. Without simultaneous protrusion of the Cornea. Transition to *Prolapsus* of the Iris.

3. The Distension of the Simultaneously Opake Cornea only, without participation of the Iris; Pseudo-Staphyloma.

a. The Cornea uninjured. Transition to the affection called *Staphyloma pellucidum*.

b. The Cornea attenuated by ulceration. Transition to what is called Rupture of the Cornea.

The doctrine of the Anterior Dropsy of the Eye, from *Staphyloma pellucidum*, as well as that from Keratocele, need not here be further considered.

The multiplied further complications and variations which take place in Staphyloma will be understood from the following considerations.

SECTION SECOND.

PARTICULAR OBSERVATIONS ON THE METAMORPHOSES OF STAPHYLOMA.

§ XII. GROWTH OF STAPHYLOMA.

The mechanism by which a Pseudo-cornea, compressed by the fluid of the posterior chamber, is distended and rendered uneven, is easily understood. It cannot be matter of wonder, that the thin transparent membrane, stretched in its position, shews itself to be distensible; it is in like manner understood, that, in the eye, when inflamed and irritated, a profuse secretion of aqueous humour takes place. The more completely the cornea is destroyed, and the Iris is exposed, the more easily must the development of a large total Staphyloma proceed. In cases of partial Staphyloma formations, some time requires to elapse before the still remaining portion of the Cornea gives way, and is carried away in the process of protrusion.

It appears much more difficult to explain the mechanism of those cases in which is found a strong thickened Pseudo-cornea, adherent with the capsule of the Lens. Upon this point no author has communicated satisfactory observations.

We must therefore previously apply conjecture to the case. The question may be stated, has the adhesion with the Capsule of the Lens taken place primarily, or is it probable that it is secondary in the process of reparation of an instance of Staphyloma? Is there in action a primary swelling of the tissue of the Iris in Staphyloma[1] by thickening? Must we derive the growth from interstitial deposition from the vessels which pass through the Pseudo-cornea? Or is the deposit to be considered only as an exudation from the surface of the Iris, as an epithelial growth from the pseudo-membrane furnished by the Iris? The last is in a particular manner likely to be the case. This conclusion I deduce from this circumstance, that in the experimental trial of excising cases of prolapsed Iris in a moderately recent state, that is from two to six days' duration, I found this last membrane covered by a layer of thick easily separable false membrane. This false membrane from analogy, I believe in general to be the development of the Pseudo-cornea. Where the Iris is less distended and protruded, it may first, and indeed more easily, produce a pseudo-membrane so much thicker, because it disposes the prolonged inflammatory state of the eye, to a continued exudation of plastic matter.

Ammon (Zeitschrift fur Ophthalmologie. Band i., 1831, seite 100) adduces two cases in which he recognised as a cause of Staphyloma formation, growth of the tissue of the Iris. His communications upon the detached portion of Staphyloma, and upon the escape of the dissolved vitreous humour, are however in too little detail to enable us to apply them profitably in theory. This is necessarily true of all researches which have been made previous to the discovery of the Pseudo-cornea by Wharton Jones.

§ XIII. REPARATIVE FORMATION OF STAPHYLOMA.

As is the case with all pseudo-membranes and reparative formations, sothe Staphylomatous texture possesses a certain disposition to secondary contraction, to cicatrizing shortening, and shrinking. It possesses in general the properties of *cicatrices.*[2] The smaller the basis of a staphyloma is, that is, the smaller the hole in the Cornea, to which the

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[1] Grundriss der Augenheilkunde. Leipzig, 1846. Band ii., p. 454.

[2] Steinberg in his writing entitled Fragments upon Ophthalmiatrik, 1844, seite 15, describes a case of partial Staphyloma in which, during the shrinking of the centre, the periphery of the cornea became wrinkled.

Iris is applied, so much the more easy is it, by reason of the cicatrizing process, to expect a spontaneous reparation. The affected portion undergoes contraction, shrinks, is definitively skinned over, and there remains a whitish or whitish-gray cicatrized spot. This surface may assume a flattened form, or it may be regularly produced with the spherical surface of the rest of the Cornea; but it may also be left standing as a more conical or a more spherical protrusion. In the last case the observer has before him a case of Partial Staphyloma, cicatrized, in a certain sense healed, yet imperfectly repaired and become stationary.

The stationary character, or the circumstance of a case of Staphyloma stopping at a stage of incomplete reparation may more readily take place, as the basis of the Staphyloma is large. Hence it occurs particularly in cases of Total Staphyloma. When the reparative process of a large Staphyloma is still only beginning, this is liable to be incomplete; it proceeds indeed to the diminution but not to the disappearance of the protrusion.

Whether there occur instances of the spontaneous reparation of Staphyloma, in which the cavity of the posterior chamber at first distended, secondarily becomes adherent, and diminishes in the same manner, in some respects as the cavity of the Pleura after the absorption of a pleuritic effusion, or as the cavity of the *Tunica Vaginalis Testis* in a case of Hydrocele after injection[1] is a point not yet ascertained. We may be permitted to think, that, as in cases in which we find adhesion of the capsule of the Lens with the Iris, this adhesion in part at first secondary in the imperfect reparation of Staphyloma, might be commenced. As the origin of Staphyloma by thickening is in general less clearly elucidated, so also upon the question of its reparation nothing determinate is ascertained. We may probably assume that Staphyloma by thickening admits of being compared to instances of prominent cicatrix-swellings, and that its development and its metamorphosis may proceed according to the same analogies. But it is more eligible not to give up too much in the search of such hypothetical comparisons, and simply to adhere to the principle that this subject requires previously to be examined anew, and to be elucidated by new researches, before any theory upon it can be proposed.

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[1] This sort of secondary adhesion process depending on the absorption of exuded matter must be distinguished from the usual primary adhesion of two surfaces.

§ XIV. RELAPSING STAPHYLOMA FORMATION.

The reparative process of a case of Staphyloma, whether it is induced spontaneously or after well directed treatment, is in many instances interrupted; we observe that the Staphyloma noticed in the process of diminution, again increases in size anew. Further after an imperfectly repaired Staphyloma has remained quite stationary for the space of a month or even for one year, not very rarely a new distension and protrusion of the same is observed.

In those cases of Staphyloma, which present dropsy of the posterior chamber of the eye with attenuated Pseudo-cornea, such relapses admit of very easy explanation. So long as the serous cavity is not wholly obliterated, probably a slighter degree of inflammatory irritation may dispose it to more recent exudation, and consequently may induce new distention of the Pseudo-cornea. If the chamber of the eye is completely obliterated, a relapse of the Staphyloma formation cannot readily be formed. Should in such cases, nevertheless, a relapse take place, then dropsy of the choroid coat may be the most probable cause of this occurrence.

One peculiar form of the Relapse of Staphyloma Formation, namely the partial puriform dissolution of the first formed Pseudo-cornea, with the occurrence of new protrusions from the same, consequently similar to *Staphyloma racemosum*, is described by Hawranek.[1] This author states that he had observed this variety in children with variolous and blennorrhœal ophthalmia.

§ XV. DEFICIENCY OF STAPHYLOMA FORMATION AFTER DESTRUCTION OF THE CORNEA.

Not always does great loss of substance of the Cornea produce a staphylomatous protrusion. It can only then terminate, when after direct exposure of the Iris, at the same time closure of the pupil is formed. If the last is not the case, the Capsule of the Lens accordingly remains uncovered, the Capsule is easily burst, the Lens drops out, and forthwith from the disk-like pit a cicatrizing layer closing the eye is formed. This mechanism Wharton Jones[2] and Hasner[3] recognised. Of the correctness of their representations I have very satisfactorily become convinced from the phenomenon of a case of traumatic Hypopyon in an aged man. I beheld after destruction of the cornea, the capsule of the lens lying bare for the space of two days, but forthwith, after bursting of the capsule, the lens came away, and a flat cicatrix arose. Nature here gives a hint, which may be serviceable in the prevention of Staphyloma and the acceleration of healing after destruction of the cornea. We open the capsule as it lies exposed and allow the lens to escape; by this means the process of cicatrization is most eligibly and rapidly induced. See § XXII.

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[1] Oesterreschische Wochenschrift, 1847, seite 1059.

[2] London Medical Gazette, 1838, page 850.

[3] Anatomisché Begrundung, seite 151.

§ XVI. HISTOLOGICAL CONSTITUTION OF PSEUDO-CORNEA.

Pseudo-cornea consists of two parts or elements; of the Iris, and its newly-formed adventitious covering. As the Iris, though the primary and generating part (the *matrix*) of the others, has, nevertheless, after the formation of Staphyloma, finished performing its part, we must regard the cicatrizing membrane formed on the cornea as the essential element of *Pseudo-cornea.* The Iris has, in a case of completely-formed Total Staphyloma, no longer any functions and signification; it becomes atrophied. Its black pigment contributes, indeed, in some instances more, in some less, to the colouring of the staphylomatous tumour; but its fibres and vessels waste away, and eventually are found only remains of a shrivelled, fissured, and completely atrophied Iris at the posterior surface of the Pseudo-cornea. It may hence be said, that the Iris, when the staphylomatous tumour has been once formed and constructed, constitutes only an insignificant, small, and unimportant part of the *Pseudo-cornea,* and that the proper *Pseudo-cornea* consists in the newly-formed cicatrizing tissue.

This cicatrizing tissue of the pseudo-cornea contains, exactly in the same manner as cicatrices of the skin and mucous membrane, cellular tissue, and epithelium.[1] Many of the early observers mistook the cicatrized cellular tissue for changed cornea substance. And, according to microscopical observation, as Frerichs has proved in opposition to Szokalski, such interchange has taken place. Occasionally, also, as has been seen in the instance of other cicatrices, ossification of the Pseudo-cornea has been observed.

The degree of thickness of the Pseudo-cornea is very different in different cases. Agreeably to the phenomena of seventeen cases examined by Frerichs,[1] thickening, in proportion to the thickness of the healthy cornea, was met with in the majority of the cases. Frerichs found in eight cases, thickening; in four instances, attenuation; in five instances, a thickness of the Pseudo-cornea, like that of the cornea. The thickness-diameter is, according to the same observer, sometimes in all places the same; sometimes, and indeed in the majority of cases, it is thickest at the edges; in rare cases, the central portion is the thickest.

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[1] Düring Dissertatio Inauguralis. Gottingæ, 1849. (From communications made by Ruete and Frerichs. Szokalski, Archiv für Phy. Heilkunde, 1846. Frerichs Hannoverische Annalen, 1847.

It is manifest that the duration of the staphylomatous tumour, its size, the mode of its origin, its relation to the capsule of the lens,[2] and other circumstances, must exert an influence upon the thickness of the Pseudo-cornea. Hence it is impossible to assign to the numerical proportions above given any positive value.

Upon examining the staphylomatous tumour after being excised by operation, we often find, in the centre of the Pseudo-cornea, a small white tubercle. Ammon, who has published several delineations representing this tubercle,[3] gives it the name of Staphyloma Kernel or *Nucleus*. The conjecture has arisen, that this tubercle might be derived from the exudation covering and blocking up the pupil. If this be the case, it must then be admitted that the doctrine of Hasner,[4] according to which, the Pseudo-cornea ought always to be formed of only one half of the Iris, is liable to many exceptions, that, accordingly, there occur instances of Staphyloma, in which the whole Iris is converted into the Pseudo-cornea.

The multiplicity of colours which are observed in Staphyloma is very great. These colours pertain, however, not so much to the staphylomatous structure as to the parts which are seen transparent through its substance. At the beginning of the disease, the dark colour predominates, in consequence of the transparent condition of the bottom of the eye,

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[1] Hannoverische Annalen, 1847, seite 431.

[2] See § xix.

[3] Klinische Darstellungen Theil, Tafel 6 und 7.

[4] Hasner, *loco citato*, seite 149. This doctrine of Hasner ought, in a peculiar manner, to recommend the observer to subsequent attention. Should this doctrine be confirmed only in one part, or only in cases of small Staphyloma, it is certain to be recognised as a highly interesting proof of progress in our view on the formation of Staphyloma. I suggested to a pupil of mine to undertake experiments upon this point on animals by means of caustic and corrosive agents. These experiments seem to have led to no clear result. I was unable myself to be a party in these experiments, because they took place during the time of my absence during the past holidays.

—a bluish-blackish shade to the deepest black. The thicker the pseudo-membrane, so much the more it assumes a bluish, greyish, whitish-grey aspect. If the vascular system predominates, we observe a reddish, or perfectly red, Staphyloma. When exudation of purulent matter, or of plastic lymph, has taken place, the Staphyloma may be of a yellow colour. A citron-yellow colouring may be perceived on individual spots here and there, in cases of old Partial Staphyloma. A figure, representing this yellow colour, is given by Dalrymple (Pathology of the Human Eye, plate xi., figure 4.) The yellow colour, in cases of this description, has manifestly its seat in the tissue of the Iris. Ruete, in Wagner's Worterbuch (Band iii., Abtheilung ii., seite 295), speaks of Secretion of Yellow Pigment, in consequence of Iritis. *Lastly*, when cases of Partial Staphyloma attain a high degree of the reparative process, they become like cases of Leucoma, form the transition to this state, and seem to be white coloured. Cases of greenish Staphyloma, of which Mackenzie speaks, I have never seen.

§ XVII. POSTERIOR SURFACE OF THE PSEUDO-CORNEA, IRIS, AND PUPIL.

A free surface naturally bounds the posterior side of the Pseudo-cornea only in the cases in which the posterior chamber of the eye is still in existence. What is usually observed on this posterior side is the *Uvea* pigment and the atrophied, wasted Iris, rent and often detached from the ciliary circle. Laterally, if still something entire is left of the Cornea the residue is distinguished by the membrane of Descemet. As this last membrane possesses a great degree of indestructibility, it may also be expected, that all that is not carried away by it, in the suppuration of the Cornea, should still be found to be present. By reason of the unequal wasting of the Iris, and the irregular state of the cicatrix, which is in part connected with this, we find the posterior surface of the Pseudo-cornea not quite level and smooth, but occupied with net-like elevations and depressions.

One peculiar consequence resulting from the irregular wasting of the Iris, the origin of the lateral pupil in instances of Partial Staphyloma, will yet require separate consideration. (§ XVIII.)

The pupil may in the different forms of the staphylomatous tumour, present very different conditions. In cases of Spherical Total Staphyloma, the adherent pupillary region is situate partly in the middle, and probably forms the Staphyloma Nucleus, partly is placed laterally according to the view of Hasner. In cases of Partial Staphyloma, anterior *synechia* of the entire pupillary margin, or of a part only of it is observed. Not unfrequently a beginning total *synechia* of the pupillary margin appears to subsist for a short time, while in the reparative process of the Staphyloma, the feeble adhesion on the one side is again loosened. This circumstance I think I have several times observed in cases of Partial Staphyloma in young children. With the concomitant turbid state of the cornea and the restlessness of the patient, the phenomenon is assuredly difficult enough to be perceived. A posterior *synechia* of the pupillary margin might arise in this manner, that after a central adhesion of the Capsule of the Lens with the Pseudo-cornea, accumulation of aqueous humour still is formed in the periphery. (See §§ XX and XXI.) Lastly, the complete adhesion between the Capsule and the Iris, with obliteration of the chamber of the eye, is a result to be expected in Staphyloma by thickening. As no quite satisfactory and definite data upon the anatomy of Staphyloma by thickening are in existence, we have nothing to communicate upon the condition of the pupil and the pupillary region in this form of disease.

§ XVIII. SPONTANEOUS IRIDODIALYSIS IN PARTIAL STAPHYLOMA.

Several years ago I observed some cases in which, through spontaneous detachment of the Iris, lateral pupil took place with reparative Partial Staphyloma. The patients declared that no wound had been inflicted nor operation had been performed on their eyes. Consequently it appears probable, that by reason of the tearing of the Iris during the spontaneous reparation and cicatrization of the Staphyloma, such separation of the Iris membrane from the ciliary circle had been produced. In studying the works of ophthalmological writers, I came upon a series of remarks which accord with this observation of spontaneous *iridodialysis*. I found that Ammon delineated four instances of this kind,[1] and that Piringer, Mackenzie, Chelius junior, Walther, Sichel, and others, had beheld similar examples. Mackenzie speaks of the lesion in the following terms. " It sometimes happens, however, that a partial staphyloma, occupying the centre of the cornea, and involving the whole edge of the pupil, contracts in time to such a degree, that the iris at one or more places gives way, or is torn from the choroid, so that one or more false pupils are formed, through which the patient obtains some accession of vision."[1] Chelius expresses the opinion,[2] that in the formation of lateral pupil we shall find the reason why the staphylomatous tumour in cases of this description has made no further progress (see § XXIV). In consequence of the formation of lateral pupil the communication between the two chambers of the eye is re-established, and hence is removed the cause which, according to the theory of Beer, formed the condition of protrusion. If this idea of Chelius be well-founded, then the origin of such instances of lateral pupil must be confined to the first period of the development of Staphyloma. To me, however, it seems more probable, that these instances of lateral pupil always arise first in the commencement of the reparative process in consequence of the contracting process in the cicatrices. Such also is the view of Mackenzie, as is clear from the passage above adduced. We have consequently to search for the cause of such instances of lateral pupil, not in the stretching distension of the Iris in consequence of exudation within the posterior chamber, but in the contraction of the *Cicatrix* or *Cicatrices* of the centre of the Pseudo-cornea.

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[1] See Klinische Darstellungen. Theil I., Tafel vii., Nr. 1–4.

§ XIX. PARTICIPATION OF THE SCLEROTIC COAT IN STAPHYLOMATOUS TUMOUR.

The sclerotic coat may, partly directly, partly indirectly, participate in the staphylomatous protrusion. When the cornea is entirely gone, the sclerotic coat forms the basis which encloses the cornea around, and the staphylomatous tumour, that is, the Pseudo-cornea, passes immediately with imperceptible boundaries over into the sclerotica. If any margin of the cornea is still preserved, it may occur that by reason of the participation of this margin in the staphylomatous tumour, the most anterior portion of the Sclerotica may be drawn along with it in the protrusion. It has been above shewn, that the affection or lesion named Ciliary Staphyloma may be produced, according to Arlt, by the pressure of the fluid of the posterior chamber, which, in many instances of Staphyloma, is increased. In general nothing else can be expected, than that in Dropsy of the Posterior Chamber, the Sclerotica also at its transition into the Cornea should be distended. The same proposition is naturally true of every instance of anterior dropsy of the eye; hence a participation of the Sclerotica in many instances above indicated as instances of Pseudo-staphyloma may always be expected. So much more is this the fact, that, agreeably to the just remark of Arlt,[1] the margin of the sclerotica further contributes to the formation of the anterior chamber. Lastly, the more that *Choroiditis* and *Cyclitis*, or inflammation of the Ciliary Circle, are found coexisting with Staphyloma, the more easily will the Sclerotica in consequence of attenuation and protrusion partake in the disease.

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[1] A Practical Treatise on the Diseases of the Eye. By William Mackenzie M.D. Third Edition. London, 1840, 8vo, p. 570. Chapter xiii., section xiv., § 3,

[2] Ueber das Staphyloma, Heidelberg, 1847. P. 45.

§ XX. CONDITION OF THE SYSTEM OF THE LENS IN STAPHYLOMA.

The following changes are here to be observed.

1. Posterior *Synechia*, adhesion of the Capsule with the *Pseudo-cornea*.
2. Forward pressure of the Lens, from exudation from the choroid coat, or from enlargement of the Vitreous Humour.
3. Backward compression of the Lens produced by Dropsy of the posterior chamber.
4. Lateral destruction of the Lens, in consequence of its being shrivelled, or in consequence of lateral prolapsus of the Vitreous Humour.
5. Shrivelling of the Capsule. Turbidity and diminution of the Lens in cases of old Staphyloma.
6. Ossification of the Lens or of its Capsule, that is, of the exudation from the latter.
7. Flatness of the Capsule of the Lens. Absorption of the Lens in the fluid of the Chamber. Complete shrivelling of the empty Capsule.
8. Total detachment of the Capsule, so that the Capsule with the Lens floats in the aqueous humour. As the fixing of the Capsule is effected by the *Zonula* so in order to its detachment an annular reparation of the *Zonula* must be accomplished.

Upon the subject of the adhesion of the Capsule of the Lens with the Iris and the Pseudo-cornea, no correct explanation is extant.

When Frerichs communicated to us the fact, that among seventeen cases of Staphyloma he had met with ten "in which the Capsule of the Lens was firmly agglutinated with the opake Lens, by means of exudation matter (coagulable lymph) the posterior chamber of the eye was accordingly obliterated;" from this fact the conclusion might be deduced, that in the majority of instances of Staphyloma no posterior chamber is left, and consequently no aqueous humour is formed, as the protruding *Momentum* or Power. This conclusion we are not entitled to establish with such certainty as Arlt has done.[1] Arlt states that he has made upon this subject decisive anatomical researches; yet he communicates upon the question nothing properly determinate. Against the statement of Frerichs, then, may be urged the objection, that all these ten cases of Staphylòma were probably not recent, not large, or strongly prominent; but that they were cases probably in the state of reparation, with a small degree of prominence, which partly were seen in the dead body, partly on account of deformity or the more easily to introduce an artificial eye, had been operated on in Paris by Sichel. The conclusion therefore upon the predominant frequency of Staphyloma by Thickening, with adhesion of the posterior chamber, is still far from being established. M. Frerichs, who undoubtedly has seen many instances of Staphyloma, might render a service to science if he would state the results of his observations on this subject.

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[1] Augenheilkunde, seite 288.

The only inference, therefore, that can at present be admitted, is, that the subject of the adhesion of the Capsule of the Lens with the Iris and Pseudo-cornea must previously be subjected to more minute investigation before positive propositions can be laid down. Adhesion of this kind, nevertheless, is probably met with, or may be expected to take place under the following conditions.

(*a.*) In cases of Staphyloma by Thickening, which probably arise in such manner, that the Iris being exposed while it is being covered by a thick false membrane, namely, the Pseudo-cornea, upon its anterior surface, farther produces posteriorly a plastic matter, and then becomes adherent to the capsule.

(*b.*) In cases of Staphyloma repaired, in which the process of repair may have advanced so far, that, after absorption of the matter contained in the posterior chamber, adhesion of the chambers follows. (See § XII.)

It is here to be remarked, that, when in a case of Staphyloma, reparation takes place in the manner that the Pseudo-cornea does not project more strongly than a normal Cornea, yet probably is of a more conical shape, there is no reason any longer to call the disease Staphyloma. It is at least denominated an absolute inconsequential, when we define Staphyloma as a protrusion, yet still apply to such eyes with Pseudo-cornea, without protrusion, the character of Staphylomatous. Certainly this want of consequence is almost unavoidable when we have once connected the expression *Staphyloma* with *Pseudo-cornea.*

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[1] *Loco citato*, seite 243.

(*c.*) In circumstances in which an exudation from the choroid coat is complicated with Staphylomatous Tumour, and, by virtue of this complication, the Vitreous Humour, along with the Lens, is pressed forwards.

(*d.*) When the Pseudo-cornea has been developed from the one lateral half of the Iris, according to Hasner, the other half of the Iris is indeed pressed to the side; and it may indeed be believed, that this part might be contracted with the probable like adhesion of the capsule displaced to the side. Prolapsus of the Vitreous Humour might besides take place, an occurrence of which we are presently to speak.

(*e.*) The Capsule of the Lens might have formed only a central attachment with the Pseudo-cornea; for instance, in the case of a central, conical Partial Staphyloma, while in the annular surrounding space is still left a posterior chamber, and within this augmented secretion of aqueous humour, there might be expected a destructive separation of the Capsule from the disk-shaped fossa, a subsequent anterior destruction of the capsule. I may state, that several times, in the eyes of horses, I have met with the attachment of the Capsule of the Lens to the Cornea, and then complete separation or laceration of the Capsule from its posterior connection. Around the Capsule, which, in such cases, is always shrivelled, Dropsy of the Posterior Chamber may be observed. Or, as Arlt states he has seen, the Vitreous Humour may be found in an enlarged condition.

" In all instances of conical-shaped Total Staphyloma," says Arlt, " we find the Capsule adherent to the Pseudo-cornea, and likewise the Lens, in cases in which it is not burst, carried forwards; in all we find the Vitreous Humour rendered fluid and enlarged; hence it is particularly the conical-shaped Total Staphyloma which contributes to the distension of the sclerotic coat in the posterior circumference of the eye-ball."[1]

The statement of enlargement of the Vitreous Humour causes in my mind some doubt. May it not be, that Dropsy round the Capsule may be mistaken for fluidity of the Vitreous Humour.

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[1] *Loco citato*, seite 243.

§ XXI. DISLOCATION OF THE VITREOUS HUMOUR BEFORE THE CORPUS CILIARE.

Detachment of the Vitreous Humour from the Ciliary Body, with Protrusion, the same lesion which is called in section of the Cornea *Prolapsus* of the Vitreous Humour, appears also often to take place in the formation of Staphyloma. This case must be distinguished from Simple Protrusion of the Vitreous Humour in the disk-shaped fossa, because there ensues, in the case here mentioned, actual detachment of the Vitreous Humour, from its connection with the ciliary body by means of the *Zonula* and a forward pressure of its lateral portion. Whether such separation is to be ascribed to the action of the muscles of the eye, as is the opinion of Arlt, or whether we must attribute it rather to the laceration from the attenuated Iris, or probably to the pressure of exuded matter, as Mackenzie suggests, or to the shrinking of the capsule, appears not hitherto to be satisfactorily determined.[1]

If we adopt the view of Hasner, that in the ordinary Total Staphyloma only the one-half of the Iris is employed in forming the staphylomatous tumour, the conjecture is very natural, that in the corresponding half of the ciliary body a separating destruction or tearing might arise.

If it is presupposed that there occur cases in which the staphylomatous protrusion depends not on dropsy of the posterior chamber, nor on the exudation from the choroid coat, nor yet upon hypertrophy of the substance of the Pseudocornea, we could scarcely think of any other causal impulse of the Protrusion, than the pressure of the Vitreous Humour, which probably after its detachment from the Ciliary Body, or after laceration of the *Zonula*, and vitreous membrane, has undergone an enlargement of its mass, of its watery content. M. Arlt represents the thing to be thus accidental; only he admits as a cause of enlargement of the Vitreous Humour the increase of space; and for the latter the *Vis a tergo* of the muscle of the eye. This, however, is an unnatural and improbable hypothesis. If, in other respects, this last hypothesis cannot be altogether approved of, it should not, however, be forgotten that to M. Arlt belongs the merit of having directed a greater degree of attention to the influence of the pressure of the Vitreous Humour in cases of Staphyloma.

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[1] See Frerichs, *loco citato,* seite 432; Arlt, Augenkrankheiten. Prag, 1851. Seite 242. Arlt calls it bursting of the *Zonula*. Mackenzie, *loco citato,* seite 459. The aqueous humour is insinuated between the vitreous humour and the choroid coat.

If the Capsule of the Lens has shrunk in the direction of the transverse diameter of the eye, the space which thus becomes unoccupied on the anterior surface of the Vitreous Humour within the ring of the Ciliary Body, must be occupied by something. As the *Corpus Ciliare* is not easily moved inwards, it may happen that the Vitreous Humour may appear beside the Lens; and we must expect then either an enlargement of the chamber of the eye, corresponding and equivalent to the shrivelling of the Capsule, or a protrusion of the Vitreous Humour in the annular or crescentic vacuity.

§ XXII. CANCEROUS DEGENERATION OF STAPHYLOMA.

Many writers, particularly Desmaures, in the year 1847, speak of the possibility that a case of Staphyloma from constant irritation and rubbing, or from unsuccessful attempts at healing, may pass into the cancerous degeneration. It is, however, to be admitted with certainty, from everything that we at present know upon the formation of Karkinoma, that this doctrine of the existence of cancer in Staphyloma, must rest partly upon tradition and theoretical prepossessions, partly on erroneous diagnosis. How very easily the latter may take place, I have myself experienced. The mistake namely occurred to me to consider as *Fungus Oculi* a case of purulent *Choroiditis*, which supervened on Staphyloma, that had been cured several years previously, and which I first beheld when it was at the height of its development. I accordingly prescribed extirpation. In a case which occurred at a later period, which still more illusively than the first resembled Karkinoma, a medullary fungus breaking forth through the eye, and in which nothing else was found than purulent Choroiditis with Staphyloma of old standing, I was prevented from forming an erroneous diagnosis solely by the circumstance, that I had several times at early periods seen the child as a patient with Staphyloma. From the perusal of the writings of ophthalmological authors, it appears that errors in diagnosis of the kind now referred to, must often have been committed, yet not known to be such. So much the more it appears that this is the place to recommend attention and precaution in avoiding them.

THIRD SECTION.

UPON THE THERAPEUTICS OF STAPHYLOMA.

§ XXIII. PREVENTION OF STAPHYLOMATOUS TUMOURS.

When the Cornea is destroyed to so great an extent that the formation of a case of Total Staphyloma must be expected, two precautionary or prophylactic operations against the formation of Staphyloma are presented. These are the extraction of the Lens and the removal of the Iris.

It has been above explained (§ XV.,) that after destruction of the Cornea and exposure of the Capsule, the spontaneous escape of the Lens, in its extraction by puncture of the capsule, induces cicatrization without Staphyloma. It hence follows, that the oculist in such a case, with the capsule of the Lens lying exposed, acts most eligibly in opening the capsule, and extracting the Lens.

Mackenzie says, simply ; " Laying hold of the exposed Iris with the forceps and removing it is another means, which would have the effect of preventing the formation of Staphyloma. If this were done the Pseudo-cornea would be formed then upon the surface of the Crystalline Lens."[1] No more details are given by this author. It is scarcely to be admitted that the proposition here stated by him rests upon direct experiments. We must therefore, agreeably to what is hitherto ascertained, consider it as much more probable that after removal of the Iris, the Capsule shall burst, than that a Pseudo-cornea should be produced upon it.

When, however, the pupil is already closed, and the Staphylomatous process is in its commencement, what should then be done. Wharton Jones[2] and Hasner[3] give the advice to divide the Iris and to extract the Lens, where the cases are favourable for such proceeding. The method appears to deserve all confidence.

In order to prevent the development of Partial Staphyloma from prolapsus of the Iris taking place, the following indications may be established.

(1.) The closure of the eyelids and the quiet supine position of the patient, with restraint from every considerable effort and action may, according to the advice of Arlt be recommended.[4] Oculists have already learned by experience, in cases of ordinary *prolapsus* of the Iris, especially in the section of the Cornea, that nothing acts more favourably than closure of the eye, and nothing more unfavourably than a laborious open condition of the eye, in which the tension of the eye, protruding the prolapsus, whether through the medium of the muscles of the eye, or through the *orbicularis palpebrarum* is originated.

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[1] A Practical Treatise, &c., p. 573, London, 1840.

[2] Ophthalmic Medicine, p. 154. London Med. Gazette, 1838.

[3] Hasner, *loco citato,* seite 193.

[4] Prager Zeitschrift 1844. Band ii., seite 80, 86.

(2.) The inflammation which induced the perforation of the Cornea, must above all be cautiously subdued. There are to be employed the same remedies which are found necessary without prolapsus of the Iris. Thus, in Blennorrhœa, nitrate of silver, in Granulation, the lead powder, and similar agents. And here, as I have had in Marburg too great opportunity of collecting experimental observations upon the efficacy of the salts of Lead, Copper, and Silver, in instances of Granular Ophthalmia, I must not pass over this occasion without bearing testimony to the superiority of the remedy proposed by Dr Buys, the discoverer of the treatment by means of sugar of lead powder.[1] Besides the means now mentioned, astringent and caustic agents, and especially nitrate of silver, are to be employed, in order to induce in the prolapsed texture the process of shrivelling, probably also that of thickening, and thereby a greater degree of solidity in the parts. It is known that many careful observers have in this manner obtained favourable results. I have reason also to believe, that in two instances I thus had promoted the process of repair in prolapsus of the Iris, which threatened to pass into Partial Staphyloma.

(3.) Puncture, and especially repeated Puncture of the prolapsed portion. It is manifest that such puncture, partly by the discharge of fluid which it causes, partly as a local stimulus producing thickening, may operate favourably upon the Prolapsus. Chelius who subjected this procedure to trial has obtained by its means some favourable results. Dr F. Chelius is of opinion[2] that the pressure of air in the posterior chamber, operates as a useful stimulus in exciting inflammation. Naturally the puncture should be made on the side on which the Lens comes not into peril.

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[1] For an account of this method and its results, see Edinburgh Medical and Surgical Journal, vol. seventy-fourth, p. 240. Edinburgh, July 1850.

[2] Ueber das Staphyloma, Heidelberg, 1847, p. 81.

§ XXIV. PROMOTION OF THE REPARATIVE PROCESS IN STAPHYLOMA.

For the reparation of a case of completely formed Staphyloma, that is, for effecting contraction and shrinking of the tumour, there is small expectation, and we have little cause to wish for this result. When the visual power of the eye is entirely lost, the object of the art of the oculist consists only in the duty of attempting as speedily as possible a palliative cure, and secure against relapses, with the smallest degree of deformity, and the fitting of an artificial eye. Reparation in cases of Total Staphyloma is sometimes unattainable, sometimes only half attainable, and the incomplete reparation is always liable to leave most deformity, and more or less disposition to relapse. The oculist, therefore, can scarcely establish an indication to make trial of the operations, with the view of effecting reparation in such cases of Total Staphyloma. Some years ago, Kückler made known some attempts of this description,[1] and recommended them to imitation; to me they appear not to deserve being imitated. The method by Kückler consists in the following procedure:—First, He splits the staphylomatous tumour in the transverse direction; secondly, he extracts the lens; thirdly, he re-opens the wound for the space of two days, by means of the scoop of Daviel; in the fourth place he cauterizes the central part of the Staphyloma for the space of several weeks, with the liquor of Belloste. That by means of this method the oculist may procure reparation, no person can dispute. Küchler adduces three cases in which the reparation took place. In one of the three cases this was attained after the second operation, because in the first operation extraction of the lens was not effected. In the last circumstance lies a weighty objection against the method. The operator is quite uncertain of completing extraction of the lens after the transverse division of the staphylomatous tumour, if it be not perfectly recent. In the second place, after extraction of the lens, the operator cannot assure himself against relapse.[2] Lastly, the division of the tumour, the introduction of the cataract knife, the repeated opening of the wound, and the reiterated cauterizing of the same with the nitrate of quicksilver, form a complicated method of treatment, painful to the patient, and by no means securing against deforming contraction of the eye-ball.

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[1] Walther's Journal, 1845. Band xxxiv. seite 170.

[2] Hasner, *loco citato*, seite 145, 156. Arlt, *loco citato*, seite 252.

In other respects, it may be employed when the staphylomatous tumour is in its origin. In this case the further progress of the disease may be prevented; reparation may be enforced, if, at the same time, the new Pseudo-cornea is divided, or a partial incision of the same is made and the lens is extracted. It is unnecessary to repeat what has been already said in the paragraph upon the Prevention of the formation of Staphyloma.

In cases of Partial Staphyloma, the object is totally different. The oculist wishes to produce reparation, and to maintain it in as much of the Iris and Cornea as are still sound. Above all, it is important to prevent the transition into Total Staphyloma. In other cases where this transition is not to be feared, the oculist desires to bring the unsightly protrusion by all possible means to the state of contraction and shrinking.

In cases of Partial Staphyloma with Closure of the Pupil, if we admit that the Closure of the Pupil and the *Synechia* of the Pupillary margin, consequently the seclusion of the posterior chamber from the anterior, and the accumulation of fluid within the posterior chamber produce the protrusion, the indication to be established will be that the operator should endeavour to re-establish the communication between the anterior and the posterior chamber, by forming an artificial Pupil, or by restoring the Pupil. This idea Beer appears first to have put in practice. Steinberg wrote on this subject at a subsequent period, in detail, and made known a very favourable example of the operation. Of this it may be serviceable to subjoin the following abridged account.

In a patient labouring under Blennorrhœa, in consequence of central abscess of the Cornea, prolapsus of the entire margin of the Pupil took place. The opening was closed; the Iris began after the lapse of eight days to be drawn backward, and the Cornea to become clear around; but the centre manifested incipient conical figure. The clearness and the conical shaping increased. In the third month puckering of the Cornea round the apex of the cone (from cauterizing contraction of the Pseudo-cornea) ceased. The conical shaping continued still augmenting; and in this process also the sclerotic coat partook. In the fifth month *Keratoiritis* took place, with new opacity of the Cornea, so that scarcely one line at the margin of the pupil was left transparent.

In the seventh month the operation was performed. Two several times it was done with the bent cataract needle; the first time from without upwards, the second time from without the lower edge; by means of a sort of lever action, the Iris was separated from the Cornea, and with an audible cracking sound (?) on the separation of the central portion of the *Synechia*.

Four weeks subsequently, a second operation was performed, in order to detach a small remain of adhesion at the lower part of the Cornea. The result was the following:—The Cornea became clear for the breadth of two lines; the conical shape was changed into spherical, with slight conical figure in the centre; the Iris became active; the Pupil was established laterally within and superiorly.[1]

The writing of Steinberg, so new and original, and its contents, have remained almost completely unnoticed. It is as if the Reviewers had conspired to avoid a difficult subject. The preparer of the Annual Report of Canstatt upon Diseases of the Eye, Herr Beger has also adhered faithfully to his habit of quickly passing over whatever is original and difficult.

Four years ago, I said what was requisite concerning a method of reporting so indifferent; but it was not of the smallest benefit. Herr Beger returned for answer, that his annual Report afforded not sufficient room to insert so lengthened a Report, "that the labour might be spared Professor Roser of taking notice of the particular original contributions on this subject." I admire indeed the dexterous management by which Herr Beger here evades the question, and at length alleges to me personal convenience, yet gives the hope that the new preparation of the Report is to remind his fellow writers of the care which he has over the science and its departments. From the great advantage which a serviceable annual Report upon Ophthalmic Medicine might render, it appears still worth the labour to bring this subject once under discussion.

Nature herself has pointed out this method in those cases in which it was shewn above, (§ XVIII.) that lateral pupil spontaneously formed and detachment of the Iris were associated with Staphyloma. Upon this subject Dr Francis Chelius makes the following interesting remark. "I have in several cases of Conical Staphyloma observed this separation at the edge of the Iris, and I think that in this is found the reason why such instances of Staphyloma at a certain stage of their development remain stationary, and the Iris not adherent with the Cornea, is not as usual pressed close upon the posterior surface of the Cornea."[1] Subsequently he adds, "If the partial Staphyloma is still in the beginning of its development, and the portion of the Cornea still uninjured is of sufficient extent, that thereby the formation of an artificial pupil is permitted, this should be the course pursued. When this operation is performed, and the communication between the two chambers of the eye is thereby re-established, the partial Staphyloma is in this manner converted into a case of Synechia, and the further development of the Staphylomatous tumour is prevented."[2]

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[1] Fragmente zur Opthalmiatrik. Mainz, 1844.

In a sense entirely opposite to the view now given, Arlt expresses himself in the following language.[3] "In conclusion it may still be regarded as an admitted fact, that with the pupil still open, cases of moderately large Staphyloma are developed, and that the establishment of an artificial pupil, where it is applicable, is capable of preventing neither the formation nor the extension of the staphylomatous tumour." The confident tone in which the preceding remark is made by Arlt might operate in an alarming manner. But the whole performance of Arlt gives the impression of a disposition irritated and void of objectivity, in which this observer, who is favourably known by many useful contributions, controverts the view of Hasner the other oculist of Prague. What Arlt represents as an admitted fact, should be marked at the most as a hitherto unknown exception; and for instance, of the attempt to prevent the development of Staphyloma by the establishment of an artificial Pupil, nothing so far as I know, has yet been communicated in the literature of Ophthalmology. The attempt also to counteract by means of an artificial pupil the extension of a staphylomatous tumour, cannot yet have been performed so frequently as to enable oculists to speak in a definite manner upon the degree of probability of the consequences of this operation, which appear not irrational.

Considered from the above adduced facts Puncture, especially repeated puncture, then cauterization or irritation by means of different agents, particularly nitrate of silver or its solution are recommended for the reparation of cases of partial Staphyloma; and by means of puncture and caustic agents oculists have often obtained favourable results. The mode of operation of puncture is easily understood. As to the operation of caustic agents, it must be allowed that the theory is not altogether clear. Upon this point, much controversy with hypothetical deductions, has taken place, as may be seen in the writings of Richter, Beer, Walther, Chelius and other authors. We are not in a condition to say, how it happens, that caustic agents by their irritation promote the solidity of the Pseudo-cornea, its thickening, its contraction, and its becoming shrivelled. We can merely adduce the analogical evidence, that caustic agents in many atonic suppurations, with slender epidermal formation, with profuse secretion, and with the growth of soft granulations, produce similar effects.

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[1] Ueber das Staphylom, Heidelberg, 1847, seite 45.
[2] Ibid., seite 48.
[3] Augenheilkunde i., seite 244.

The excision of a small portion from the Pseudo-cornea is rarely to be undertaken with the view of effecting reparation in cases of Partial Staphyloma. In the great majority of cases, when, in partial Staphyloma excision is performed, though the operator may have removed the whole or the greatest part of the Staphylomatous Tumour, he has not by these means effected reparation so much as removed the morbid part, so that palliating excisions of this kind come under consideration in the ensuing paragraph.

§ XXV. PARTIAL EXCISION OF THE PSEUDO-CORNEA.

The method, the object of which is the process of Reparation in Staphyloma is adopted in all cases in which the protrusion in one part is taken away, at another part the process of repair is given up. Naturally, all gradations are here possible. The operator removes smaller or larger portions, a fourth, a half, or even three-forths of the Pseudo-cornea. The more he takes away, the more is the patient insured against relapses; but the healing process is scarcely more apparent than the reparative process, when a large portion is removed; but it rather has the character of simple cicatrization, or corrugation of the anterior part of the eye.

When in cases of total Staphyloma only a small portion, the size of a vetch[1] is taken away, for instance only one-third of the Pseudo-cornea, the operator in many cases accomplishes reparation, probably with adhesion and obliteration of the posterior chambers of the eye, especially when the Crystalline Lens is removed; but in other cases the cavity of the chamber of the eye is again occluded, and a new accumulation of the aqueous humour may take place. When on the other hand, the chamber of the eye no longer exists, that is, when its anterior wall is either entirely or almost entirely carried away, no dropsical or watery accumulation can take place in the posterior chamber of the eye.

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[1] Here there is a note stating that the term "Linsengrosses" is very indefinite. To obviate this we make it the size of a vetch.

In cases of partial Staphyloma an excision of the Pseudocornea, merely partial, appears, when excision is preferably adopted, to be decidedly deserving of recommendation, in slight cases, in which caustic agents and puncture are of no avail. Upon this subject we find in books little information. A few notices and opinions, which are met in the writings of different authors, may here be given in a collected form.

Dieffenbach has the following remarks. "In some few cases, in which the lateral surface of the base of the Staphylomatous tumour shews only slight opacity, I have removed the middle portion by means of a cuneiform or wedgelike excision, and have carried a fine thread through the edges of the flap (he should have said the wound); and by these means often have restored the complete shape of the pupil, and restored some degree of the power of vision."[1]

The following statement is made by Hawranek.[2] "If it be a case of Partial Staphyloma, which by its firmness and magnitude presses together the hitherto normal portion of the Cornea, and renders useless for the purpose of vision, the portion of the pupil which is left, if the tumour have been removed by operation, and the process of granulation have in no way been disturbed, then by means of the progressive contraction and flattening of the Cicatrix and the re-establishment of the normal arching and size of the Cornea, the portion of the pupil not involved in the Staphylomatous degeneration recovers its defining power, and vision is restored."

The expression, process of granulation (Der Granulations-Process) must here be taken in a figurative sense. Granulation does not take place in this situation.

Lawrence informs us that he has never found excision for the cure of Partial Staphyloma necessary. This is equivalent to saying that he has always been able to attain the object by means of other measures, especially by Puncture.[3]

Chelius expresses himself not very distinctly in the following passage. "Should repeated incision of the margin of the Staphylomatous Tumour (that is lateral puncture with the cataract knife of Rosas) not be sufficient, a part of the degenerated Cornea should then be removed. If the pupil is involved in the adhesion, or the part which is left, is covered by an incurably opake cornea, the formation of an artificial pupil may serve not only to restore the power of vision, but also to the removal of the Staphylomatous Tumour."[1] The last proposition we can scarcly understand in any other light than this; that the removal of the Staphylomatous excrescence is to be undertaken by excision, and at the same time the formation of an artificial pupil by means of Iridodialysis.

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[1] Operative Chirurgie, ii., seite 211.

[2] Oesterreich Wochenschrift, 1847. - No. 35.

[3] Treatise on Diseases of the Eye. London, 1844, seite 368.

"Should the Conical Staphyloma extend," says Francis Chelius, "the only means which remains is the removal of the Staphylomatous excrescence. It is not, however, necessary to remove this from its foundation; all that is requisite is to take away a part of the Staphylomatous Cornea."

When this author here adds; "Only one part of the Iris not involved in the adhesion is thereby wounded;" it must be remembered, that the discovery of Mr Wharton Jones remains in this indication unregarded. Whoever keeps in view the doctrine of the Pseudo-cornea will not think of taking away more of the Staphylomatous Tumour, than the proper Pseudo-cornea. The operator will on the contrary allow the edge of the latter to remain, by which prolapsus of the Iris may not again take place.

Hasner states his opinion in few words. "The development of Staphyloma, from prolapsus of the Iris, may be very easily prevented, by making an opening at the apex of the recently prolapsed part." "The excision of a part by means of the scissors and knife, is evidently more to be recommended than the simple puncture. But the opening must have at least the size of a normally dilated pupil."[2] "Among the caustic agents, the nitrate of silver in the form of pencil is most to be commended, because we can control its cauterizing operation. By means of the vigorous cauterization of the prolapsed part at the apex two or three times repeated, the latter is perforated, while at the same time this portion of the Iris is brought into a state of irritation favourable to cicatrization and union with the adjoining parts."

§ XXVI. RADICAL OPERATION FOR STAPHYLOMA.

When the operator cuts away the whole Staphylomatous production at its basis, or when it is entirely destroyed by corrosive agents, relapse cannot possibly take place. This is the immediate ground on which the method of operation employed by Beer, namely, the removal of the whole Staphylomatous tumour, has obtained the greatest number of adherents. But while the danger of relapses is sought to be avoided by means of complete removal, it is requisite for the operator to be upon his guard, that he proceed not to the opposite extreme, and take away too much. He might then induce evacuation of the eye, with disfiguring collapse of the eye-ball, and alarming hæmorrhage, particularly in young children, by carrying the section to an excessive depth. A more eligible course is to leave something of the Pseudo-cornea standing, since the retention of a proportionably slender edge of the same, will cause no reproduction of the protrusion. It is recommended in this point of view to adopt a sort of middle course, which Walther has praised. When, therefore, the operator cuts away fully two-thirds or even three-fourths of the Pseudo-cornea, and therewith combines extraction of the Lens according to the advice of Wharton Jones and Hasner, this is indeed the most certain method which he can employ for accomplishing the cure of a case of Total Staphyloma.

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[1] Ueber das Staphylom, seite 49.
[2] Entwurf, seite 155.

The mechanism of the formation of the *Cicatrix* after the operation for Staphyloma, appears not in all cases to be the same. We observe sometimes speedy formation of a fibrinous Pseudo-membrane, sometimes a more tedious growth of red granulations spreading over the exposed Vitreous Humour. The contraction of the *Cicatrix*, around the basis, from which the Staphylomatous growth was taken away, contributes in a very perceptible manner to the closure of the orifice in the wall of the eye.

CONCLUSION.

In the preceding pages no new ideas or new facts are communicated. They merely are what persons intimately acquainted with Ophthalmic Medicine and Surgery already know. The purpose of this paper is simply this, to exhibit the recorded facts in such order, and to place the questions still undetermined in such position, that to those who wish to study the subject more extensively, the labour of obtaining a solid foundation may be rendered more easy. An exhaustive treatment of the subject, a comprehensive report upon all the new contributions thereto pertaining, and upon all the questions relating to Staphyloma, cannot be given in this place. It is only the most important part, and even this as briefly as possible, to which we can give attention.

There are at present many labourers in all the branches of Medicine occupied in advancing the progress of science; but the most that is produced, serves to make the science more difficult and incapable of being fully viewed, rather than to attain a higher degree of intelligence. When we survey the literature of such a subject as Staphyloma, we meet with numerous prolix repetitions of that which has been often said, numerous repetitions of old theories, and little citation of facts, few observations. The inquirer must laboriously search through many volumes until he collect the few facts, which are deposited in the literature of the subject.

Here I may on this occasion be permitted to exhort the cultivators of science, to observe brevity, and to simplify, by presenting their results accompanied only by the most necessary reflexions. Whoever has occasion to make upon controverted questions decisive and certain observations, namely, those derived from Pathological Anatomy, may furnish thereon favourable sketches not unserviceable, and will not withhold his own contributions from his fellow-labourers. But that man will render a service to science if he avoids writing a long Essay, and communicates the results of observation in profitable brevity.

On the other hand, certainly, retrospective views and comprehensive compilations are not to be depreciated. But what we most require are short condensed reports, by means of which the general view of the progress of individual departments is facilitated, and the knowledge and usefulness of recent results may be made accessible to those little familiar with literature. Even the most active and the most industrious can form no just view, when this is not made possible by the co-operation of several reporters treating the individual subjects fundamentally. It is to be hoped that our science may raise up express reporters, by which we may in future find more information in newly published works, and not be so frequently deterred by the tediousness of reading repeatedly what has been long known.

Professor Roser subjoins as an Appendix to his Essay the paper by Mr Thomas Wharton Jones, upon the Pathology of Staphyloma. At first sight it appeared that a reference to this paper in the Medical Gazette might be sufficient. As, however, the Author attaches great importance to the observations of Mr Jones, and thinks any Essay on Staphyloma incomplete which does not give these observations, it has been deemed proper in this respect to follow the example of the German author.

Some Observations on the Pathology of Staphyloma. By THOMAS WHARTON JONES. (Medical Gazette, 24th February 1838. Volume xxi. New Series, vol. i. p. 845.)

(To the Editor of the Medical Gazette.)

SIR,—The term *staphyloma* has been applied, by writers on the diseases of the eye, to various prominences on the surface of that organ, produced by a partial yielding of its coats. But that form of projection to which the name Staphyloma was originally given, and for which it is still most commonly employed, occupies the place of the cornea, and is, according to the opinion of all authors (I speak under correction), the cornea itself, degenerated and distended, together with the iris, which has become adherent to it throughout its whole extent; the anterior chamber being, of course, annihilated. The following words of Mr Lawrence* express, I think, very clearly and fairly, the generally received opinion as to the mode of origin of staphyloma:—" In order that the state of staphyloma should be produced, there must be severe inflammation of the eye, involving the entire cornea, and rendering its texture opaque; that inflammation must also have extended to the iris, and caused it to adhere to the cornea; and there must be increased secretion of the aqueous humour, to push these unnaturally connected structures forwards."

This form of staphyloma is usually called *spherical staphyloma of the cornea,* and it may be either *partial* or *total.* In the following remarks, every other form of staphyloma—such as conical staphyloma, staphyloma scleroticæ, &c. is excluded. What is known by the name of *staphyloma iridis,* will be shewn to be merely a stage of the disease under consideration.

The structure of the cornea is changed, the iris adheres to it, surface to surface, and the two together are distended into a staphylomatous projection. Such, in a few words, is the commonly received opinion regarding the formation of staphyloma. I have examined many cases of inflammation of the eye—inflammation of the cornea, inflammation of the iris, inflammation of the membrane of the aqueous humour, &c.; but never observed adhesion between the two membranes take place in the manner described. In penetrating ulcer of the cornea, and *prolapsus iridis,* of course the prolapsed part of the iris adheres to the cornea at the one point.

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* Treatise on the Diseases of the Eye, p. 373.

But though the two membranes have come into contact in their whole extent, in consequence of the escape of the aqueous humour through the opening in the cornea, made by the penetrating ulcer, and though, in consequence of the attending inflammation, the circumstances favourable for adhesion exist, still the iris does not adhere to the cornea surface to surface, as the *pleura pulmonalis* does to the *pleura costalis.* On the contrary, as soon as the ulcerated opening in the cornea closes, so that the aqueous humour is allowed to accumulate, the iris recedes from the cornea, and the anterior chamber is re-established. The only adhesion between iris and cornea is at the one point where the *prolapsus iridis* took place.

Again: cases of penetrating ulcer of the cornea occur in which, the aqueous humour having escaped, and the iris come into contact with the cornea, but no prolapse of the former having taken place, no adhesion at all between the two ensues, but the iris recedes from the cornea as soon as the opening in it from the ulcer closes, and prevents the farther escape of aqueous humour. One should suppose that if adhesion between the anterior surface of the iris and inner surface of the cornea was a thing prone to take place, that it should have been observed in those cases of inflammation of the membrane of the aqueous humour in which the operation for evacuating the latter has been performed; but I apprehend no one ever saw such an event ensue. In the operation for the extraction of the lens in cataract, the aqueous humour having escaped, the iris comes into contact with the cornea, and continues so for a considerable period; but if there be no prolapsus iridis, adhesion never takes place. If the iris does not adhere to the cornea when these two parts come into contact, from the escape of the aqueous humour, and while in a state of inflammation, much less do they adhere, independently of the removal of that fluid.*

But it may be said, it is not in consequence of such inflammations of the eye that staphyloma occurs, but that "purulent, gonorrhœal, and variolous ophthalmia, are the most frequent causes of staphyloma." True; but under what conditions does staphyloma occur in those diseases? Not by adhesion of the iris to the cornea, surface to surface. Mr Wardrop says, "as far as I have been able to observe, staphyloma never occurs unless the cornea has been previously ulcerated, and unless the ulcer has penetrated into the cavity of the aqueous humour and destroyed the cornea as deep as the internal tunic." I apprehend it would have been nearer the truth to have said, that staphyloma never occurs without more or less extensive destruction of the cornea. Purulent, gonorrhœal, and variolous ophthalmia, are the diseases of the eye, in consequence of which staphyloma most frequently occurs, and these are the very diseases in which the cornea is more or less extensively destroyed.

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* Middlemore on Diseases of the Eye, vol. i., p. 512.

The only mode of formation of staphyloma which I could ever trace is the following.

If, in scrofulous, catarrhal, or catarrho-rheumatic ophthalmia, there be a penetrating ulcer of the cornea, the aqueous humour escapes, the iris falls forward into contact with the cornea, and a small part of it is perhaps prolapsed through the ulcerated opening. The progress of the ulceration being stopped by the yielding of the inflammation, the prolapsed portion of iris, and the ulcerated part of the cornea, are involved in one cicatrix. The opening in the cornea being thus closed, the aqueous humour again collects, and the anterior chamber is restored, though somewhat diminished, in consequence of the partial adhesion between the iris and cornea; *(synechia anterior.)* There is no prominent distension on the front of the eye in this case, because, as the inflammation subsides, the small protruded portion of iris shrinks and flattens. But if the destruction of the cornea has gone on farther, either by ulceration or the giving way of an onyx, and considerably more of the iris has protruded, the prolapsed portion of the iris does not shrink when the inflammation begins to abate, as in the former case, but remains, and forms a projection at one part of the cornea, generally the lower or lateral. This projection is at first merely a bag of the iris distended by the aqueous humour; but by and by its exposed surface becomes covered by an opake firm tissue, of the nature of the *tissue of cicatrices*, and this tissue is incorporated at the base of the tumour with the sound cornea. The projection, the mode of origin of which I have just described, is a *partial staphyloma;* it is not a distention of the cornea itself, but a protruded portion of the iris covered by a *new tissue*, intended to supply the loss of substance which the cornea has sustained.

The mode of origin of a *total staphyloma* is essentially the same, but differs only in degree. The whole or greater part of the cornea being destroyed, as occurs in gonorrhœal, purulent, and very often in variolous ophthalmia, as also that of new-born infants, the whole iris falls forward, the pupil becomes closed, and the aqueous humour being thus allowed to accumulate in the posterior chamber, the iris is kept distended in the form of a tumour on the front of the eye. Its surface gradually gets covered with an opake cicatrix-like tissue, or pseudo-cornea, which assumes a greater or less degree of thickness, and a total staphyloma is the result. Sometimes the central part of the cornea only is destroyed, a ring of the circumference still remaining; the staphylomatous projection has then the form of a small globe stuck on the front of a larger.

In 1834, when in Glasgow, I directed the attention of Dr Mackenzie to the subject, and he adopted my views so far as to admit my description of the origin of staphyloma into the second edition of his work, then in preparation (p. 602). Subsequent and more extensive experience and observation have convinced me more fully of the correctness of my views, and induce me to speak more decidedly on the subject than I did at that time.

Founding my reasonings on those views, I conceived that the supply of aqueous humour in the still-existing posterior chamber was what kept up the distension of the iris, and the consequent moulding of the pseudo-cornea on its surface in the form of a round prominence on the front of the eye. If, therefore, it was natural to infer the source of the aqueous humour could be destroyed, we should not have the development of the staphylomatous projection, or, if already formed, it would disappear. For this purpose puncturing the tumour is not found to answer well. To break in upon the integrity of the posterior chamber, I conceived the simplest and most effectual plan would be to extract the lens,—an operation which I put into practice in the following case.

A young man about twenty-two years old came to me labouring under the effects of severe purulent ophthalmia of both eyes. In the right eye I found the cornea destroyed, and the iris protruding and distended with aqueous humour, the pupil being closed. The left eye had also suffered very much; there was penetrating ulcer, prolapsus iridis, and consequently considerable distortion and contraction of the pupil. Both eyes were still affected with the inflammation, and it was very doubtful whether the left eye could be prevented from getting worse, especially as it was evidently kept in a state of additional irritation from the presence of the staphyloma in the right. By an incision with a Beer's cataract knife in the protruding and distended iris, the lens was extracted. Severe re-action followed; less perhaps in consequence of the operation, than in consequence of the patient not having been in a situation to take proper care of himself. The iris did not again become distended; on the

contrary the eye shrunk, and irritation being thus removed, the left eye progressively improved, as far as the organic changes it had already undergone allowed, and farther than there had been previously reason to hope for, as vision was preserved sufficient to enable him to resume his employment as a porter.

In those cases in which the eye is destroyed by purulent ophthalmia, whether of adults or new-born infants, gonorrhœal ophthalmia, variolous ophthalmia, &c., and in which staphyloma does not form, but the eye-ball shrinks and becomes atrophic, I suspect (though at present I cannot adduce any direct proof) the lens has escaped on the giving way of the cornea.

The conclusions, then, which I draw from my observations are the following.

1. That the iris and cornea do not unite surface to surface, and if they unite at all it is only partially, and that in consequence of penetrating ulceration of the latter, and prolapse of the former.

2. That the tissue composing a staphyloma is not degenerated and opake cornea, but a *new tissue*, of the nature of the tissue of cicatrix, developed on the anterior surface of the iris exposed by the destruction of the cornea itself.

I am, Sir, your obedient servant,

T. WHARTON JONES.

30, NEWMAN STREET, OXFORD STREET,
17th February 1838.

In the foregoing observations it may be doubted, whether Professor Roser takes quite a correct view of the position and duties of Reviewers and Writers of Reports on the Medical Sciences. The idea of intentional neglect or conspiracy is, we are satisfied, altogether without foundation. The reason why some books and some propositions are neglected, is simply because there is not room nor time at present to do every thing; and those subjects therefore only are brought under notice, which are either most important, or have some similar quality to recommend them to attention. It is not easy to say what subjects or divisions of subjects are at present most important. It is clear that Professor Roser, like all those attached to their own departments, thinks the pathology and treatment of Staphyloma of very high importance; and it is right that he should do so. Whether others share in this opinion is a question, which we have no means of resolving. But Professor Roser never thinks of the great labour and knowledge required in preparing such Reviews and Reports, and the necessity that there is of preventing them from being so lengthened that they shall be either read or purchased.

It is chiefly to obviate the complaint above made that his Essay is here inserted entire. Yet we are not sure that for this even thanks shall be given.

ART. II.—*Observations on the Forms of Staphyloma.* By JOHN THEOPHILUS FABINI, M.D., Master in Opthalmic Art, Public Ordinary Professor in the Hungarian University of Pesth. (Doctrina de Morbis Oculorum. Editio Altera. Pesthini, 1831.)

[The following description of different forms of Staphyloma, by John T. Fabini of Pesth, seems entitled to attention in this place from its brevity and clearness. It may be remarked that Fabini makes in § 514 a near approach to the doctrine maintained by Mr Wharton Jones. On the other hand, he makes certain statements, which, if not positive mistakes, rest on very uncertain grounds. Thus, in the same section he speaks of union immediately between the Cornea and Iris, implying, as appears from the subsequent expressions *ope lymphæ exudatæ*, that this immediate or direct union takes place without coagulable lymph. This is simply not the fact; no union takes place without this exudation. It may be small, and scanty; or copious; it may be thin or thick; but it always takes place, and is in no case of adhesion wanting.

Again, in § 515, he falls into the mistake of representing the staphylomatous tumour to degenerate into skirrhus. This, as Roser remarks, there is reason to believe never takes place.

Another statement in the same section of doubtful correctness is that staphylomatous tumours are irritated by the eyelids. There is no doubt that in several cases they are irritated by the eyelids; but very often they themselves act as irritants, and keep up constant inflammation and irritation both in the eyeball and eyelids.

One point, which seems to be either overlooked or not sufficiently estimated in the pathological relations of Staphyloma, may here be mentioned. Before Staphyloma has taken place, invariably so much mischief is done to several textures of the eye, the Cornea, the Iris and Uvea, the membrane of the aqueous humour, and the capsule of the lens, that the whole of these textures, and not unfrequently contiguous ones, as the ciliary circle, the ciliary processes, the anterior part of choroid coat, and even the Retina, and the hyaloid membrane, are thrown into a state of chronic inflammation, more or less extensive, and more or less obstinate. It hence results that the staphylomatous eye is always ready to be thrown into a state of acute inflammation, and is liable to pass into complete disorganization of the whole eyeball. This forms the best reason for attempting what is called the radical cure of *Staphyloma ;* because so long as the injured and chronically inflamed parts remain, so long will the eyeball and its textures be liable to fresh attacks of inflammation.

It may be observed, that in the use of escharotic agents, the butter or chloride of antimony is by no means an eligible one. It was indeed strongly recommended by Richter, who used it either in all cases, or very frequently. It has this great disadvantage, however, that in consequence of its fluidity, it is liable to produce more extensive destruction of parts than is proper. A much safer agent is the nitrate of silver.

In the following abstract from the work of Fabini, the numbers of the original paragraphs are given for the sake of facility of reference.]

Fabini distinguishes three forms or kinds of Staphyloma. 1. *Staphyloma Corneae,* including the affection called *Staphyloma Pellucidum.* 2. *Staphyloma Corporis Ciliaris ;* and 3. *StaphylomaIridis,* including *Staphyloma Racemosum.*

1. STAPHYLOMA CORNEÆ.

§ 513. This disease denotes adhesion of the Cornea with the Iris, and the abnormal expansion of these tissues. Either, part of the Cornea is agglutinated with part of the Iris, and is protruded ; or these membranes are morbidly united through their whole extent, and form a prominent tumour. Staphyloma of the Cornea is accordingly distinguished into partial and total Staphyloma. In every case of Staphyloma, the Cornea, which is united with the Iris, is rendered opake, and being wholly changed, is deprived of its usual character.

Notwithstanding, however, in partial Staphyloma, if the pupil be not involved in the morbid adhesion, vision is left in varying degree, though never in a very perfect state. In total or complete Staphyloma, vision is always entirely destroyed, yet the perception of light remains. Total Staphyloma is usually subdivided according to its shape into *spherical* and *conoïdal.* Of these two varieties, the spherical attains a larger volume than the conical; causes greater irritation to the eyelids, and frequently excites chronic inflammation of the eyeball, with a varicose state of the vessels. Occasionally the spherical Staphyloma swells to so great a size that it bursts; after this occurrence the eyeball usually becomes diminished, but it may again return to its previous size. Sometimes, however, upon the bursting of the Staphylomatous tumour, there ensues considerable inflammation by which the altered membranes are wasted, and the morbid excrescence is removed.

§ 514. Staphylomatous tumours of the Cornea always arise in a secondary manner, as the results of previous attacks of ophthalmia. They usually, however, are the consequences of severe attacks of the exanthematic and blennorrhœal ophthalmias; although any other inflammation of the eye, affecting the iris and cornea may induce lesions of this kind. The reason of this is, that to the production of Staphyloma it is requisite, in the first place, that the Cornea and Iris during the inflammatory process may be agglutinated by adhesion; and, in the second place, that the secretion of the aqueous humour may continue; because by the accumulation of this fluid these agglutinated membranes are protruded. The reason again why at one time, total Staphyloma, at another time, partial Staphyloma is formed, depends upon the nature and degree of the inflammation. The partial form of Staphyloma most commonly takes place when the Cornea is perforated by a penetrating ulcer, yet its mass, though void of the normal structure, is reproduced, and forms a partial union with the Iris which is pressed against it. If, by a similar accident, the whole Cornea is deprived of its normal texture, and becomes completely united with the Iris, total Staphyloma of a globular shape is produced. This same result we observe to take place, if the Cornea and Iris, when in a state of inflammation and swelling, are agglutinated either immediately, or by the aid of exuded coagulable lymph. But if the Cornea and Iris become altogether adherent, yet the mass of the former is in certain points destroyed, the expansion of the united membranes will be unequal, and in this manner total conoidal Staphyloma will be produced. From this it appears, that conoidal Staphyloma is induced by the more severe forms of inflammation, conjoined with deep ulcers in the Cornea, if reproduction is languid in the points affected by ulceration.

§ 515. Staphylomatous tumours in this respect, that in all cases they may be safely removed, admit of a prognosis to a certain extent favourable. But although by means of this removal in cases of partial Staphyloma, if any vision be left, that degree only can be preserved but in no case increased, yet this circumstance of comparatively favourable prognosis does not prevent the occurrence of a two-fold inconvenience. And, in the first place, assuredly all danger which is associated with staphylomatous tumours is happily averted by this means. For staphylomatous tumours, especially when of large size, are liable not unfrequently to become inflamed, and occasionally to degenerate into skirrhus ; for, in consequence of their projection, they are in part exposed to external injuries, and to the severity of certain influences, especially atmospherical, and in part they are subjected to constant irritation by the eyelids. The removal of the staphylomatous tumour is further attended with this advantage, that the deformity thence arising is removed. There always remains, indeed, in such circumstances, a cicatrix and opacity of the Cornea ; yet the shape of the eye is always improved by removing the excrescence. Further, the shape of the eye after the removal of a case of Total Staphyloma, in which vision is always destroyed, may be in a remarkable degree rectified by the adaptation of an artificial eye.

§ 516. The treatment of Staphylomatous Tumours of the Cornea is accomplished sometimes by caustic applications ; more frequently by instruments. Caustic agents, and among these principally lunar caustic or nitrate of silver and butter of antimony, or the chloride, are put in use against cases of partial Staphyloma of small size. In the administration of these caustic agents, however, the greatest care ought to be observed, that only the apex or top of the Staphylomatous tumour be touched by them, and the other parts of the eye be not cauterized. Besides this, in applying the chloride of antimony, it should, on account of its fluid form, be applied in such manner, that while the eyelids are aptly separated, the pencil dipped in this caustic may be applied to the extreme point of the staphylomatous tumour ; and immediately afterwards another pencil dipped in milk or any other mucilaginous liquor may be applied to the spot cauterized. Whatever caustic agent is employed, one single application is in no instance sufficient to effect the removal of the tumour. It is not however eligible to apply the caustic repeatedly, unless the eschar has dropped off and the irritation of the eye has completely subsided.

§ 517. Total Staphyloma of the Cornea, and in like manner Partial Staphyloma, when of a large size, it is impossible to remove by caustic remedies. In the removal of such forms of Staphyloma, therefore, it is requisite to employ a peculiar mode of treatment, which consists in excision by the base. This operation consists of two parts, in the first of which the middle of the Staphylomatous Tumour, either below or above, is to be detached, and in the second this is to be cut off on one side. The instruments requisite for such purposes are, the cataract knife, either of the usual size or a little larger, the forceps or *volsella,* and the scissors of Daviel.

The first part of the operation is accomplished by the cataract knife, which, with its edge directed either upwards or downwards to the external canthus, in the middle of the height of the Staphylomatous Tumour, is carried down near its base and is carried forward, so that it may come out towards the internal canthus, likewise at the base of the Staphylomatous Tumour, and at the same level in height. Then by carrying the knife further, as in the semilunar section of the Cornea, each portion of the Staphylomatous Tumour is loosened.

When the first part of the operation is completed in the manner now mentioned, the surgeon seizes by the forceps the flap or portion of Staphyloma thus detached, raises it slightly, and by the scissors of Daviel cuts off also the other at the base. In this part of the operation both the assistant and the operator should take the greatest care to avoid making incautious pressure on the eyeball; because if this be done, a considerable part of the Vitreous Humour with the crystalline Lens is discharged.

§ 518. When the operation for Staphyloma has been completed, the same dressing is to be adopted which is used after the operation of extracting the cataract, and the patient being placed carefully in bed, is directed to lie on his back for the space of about six days. The inflammation of the sclerotic coat which follows, terminates in the exudation of lymph, which is coagulated into the membranous form, and closes the opening in the eyeball produced by the operation. This membrane is at first thin and transparent, so that patients are able to distinguish large objects; presently, however, it becomes thick, perfectly opake, tough, and capable of admitting the adaptation of an artificial eye.

Not in all cases, however, is the operation attended by the same success. For when the vessels are in a greatly varicose state, in consequence of the large afflux of fluids, conjoined with the succeeding reaction, and in consequence of the resistance withdrawn from the anterior part of the eyeball, the varices are easily ruptured, and blood in part escapes in large amount, partly being accumulated between the sclerotic and the choroid coat, causes protrusion of the latter along with the retina in the manner of a globe. This hæmorrhage and the accompanying pains immediately cease as soon as the protruded choroid coat and retina are cut off. In these circumstances, however, the residual part of the eyeball is too small to admit of the adaptation of an artificial eye.

2. HYPERKERATOSIS; OCHLODES; *Staphyloma Cornea Pellucidum* of Wardrop and other authors. Conical Cornea.

§ 519. This disease or malformation, which is known also by the name of *Ochlodes* and *Staphyloma Cornea Pellucidum,* consists in a luxuriant growth or hypertrophy of the substance of the Cornea. In no case is this increase of substance beheld through the whole extent of the membrane; but only in a certain spot, not often in the centre, a conical entirely pellucid prominence, or one provided with an apex of brilliant grey, is observed. When the prominent spot of the cornea is perfectly bright, it generally surpasses the sound cornea in its pellucid aspect, and according to the varying motions of the eye, it reflects at times a reddish, and at other times a yellowish light. Vision is weak in consequence of the irregular refraction of the rays of light; and this weakness of sight is so much more considerable, in proportion as the protuberance is situate more near to the centre of the Cornea. This disease rarely induces *myopia.* The anterior chamber, when the eye is viewed in the lateral position, appears to be neither enlarged nor diminished.

§ 520. In that case, in which the prominence of the Cornea possesses perfect pellucidness, this rare affection is almost in all cases congenital. When, however, the apex of the prominence is grayish, it indicates the effect of scrofulous *keratitis* or inflammation of the Cornea of long duration.

The prognosis is in all instances most unfavourable, nor can the lesion be cured by any means of art. Puncture of the Cornea frequently repeated, which is by some oculists recommended and practised, is inadequate to effect either cure or amendment; for the unnatural protuberance is caused not by any fluid contained within and between the plates of the Cornea, but by an actual increase in the mass of the cornea which is solid.

(The account here given of Conical Cornea or Pellucid Staphyloma is not so complete as that contained in the work of Dr Mackenzie. It is by no means agreed among those who have seen the lesion that it consists as represented first by Sir William Adams, and then by Fabini, as morbid thickening and growth of the substance of the Cornea, or a Hypertrophy of that tunic. Mr Wardrop, who was one of the first to describe this affection, represents the irregular portion at the apex of the cone to be generally very thin; and Dr Jäger of Erlangen, who examined anatomically the eyes of a person who had been affected during life with conical cornea, found the apex of the cornea very thin, but the marginal and peripheral portion of the cornea thickened.

In an instance which was seen by the author of this note in the year 1818, and which was witnessed by several surgeons in Edinburgh, and also by Sir David Brewster, the disease or lesion, which took place in a female between twenty-five and thirty years of age, had existed for a long time, but had latterly acquired a degree of increase which impaired vision very much. The cornea in this case seemed to have become thickened. But as the eye was examined only in the living body, this might be an optical illusion.)

3. STAPHYLOMA CORPORIS CILIARIS; Staphyloma of the Ciliary Body.

§ 525. This disease, which was first described by Walther, consists in an abnormal expansion or enlargement of the Ciliary Body, which evinces its presence by an annular swelling of the Sclerotic coat, extended all round from the margin of the Cornea, to the end of the Ciliary Body. Of this tumour the greatest breadth usually extends in the upper part, and the smallest at the external canthus, and in general it is almost entirely concealed when the eyelids are open in the usual manner. The colour of the Staphylomatous tumour is sky-blue, and is derived from the circumstance, that the varicose Ciliary Body appears through the sclerotic coat, which is considerably distended and extenuated. The surface of the tumour, especially in some places, presents furrows, because the ciliary processes are seen through the sclerotic coat. That part of the sclerotic coat which is situate behind the boundaries of the Ciliary Body, presents no morbid phenomenon, except that in the same spot abundant varicose vessels conveying blood are seen proceeding to the base of the staphylomatous tumour, covering the surface of the tumour by a network, and insinuating themselves into its substance.

§ 526. The causes of this disorder are principally to be sought for in the circumstance of external injuries, violently affecting the Sclerotic coat where it covers the Ciliary Body, and in attacks of inflammation fixing their seat on the Ciliary Body and the adjoining parts.

As to the cure of this malady, the eligible course consists in operation, by means of which the degenerated part of the Sclerotic Coat, the Ciliary Body, the Crystalline Lens, the Iris, and the Cornea, are all removed by excision. This operation is performed by Walther in a similar manner to that which is performed for the removal of cases of Total Staphyloma of the Cornea. The cataract knife being carried down behind the staphylomatous part of the Sclerotic coat, the semi-lunar section is completed, and, from the upper part, the staphylomatous tumour is cut off by the scissors. If, after the operation, nervous symptoms make their appearance, these it is requisite to allay by the employment of nervine hypnotic medicines. That the succeeding inflammation and suppuration continue for a long time, and that the cicatrix is formed only very slowly, is taught by repeated observation.

4. STAPHYLOMA IRIDIS.

§ 630. The name of *Staphyloma Iridis* is given to that morbid state, in which the membrane of the Iris protruded through an opening or gap in the Cornea, degenerates, and admits not of being again replaced. This disorder has received various names, according as it varies in size and shape.

If Staphyloma of the Iris, that is, the protruded portion, exceed not the head of a fly in size, it is called *Myocephalon;* if it be larger, and is seated on a broad basis, but has a flat apex, it is called *Clavus* or *Hylon;* if it is that form of Staphyloma so large that it forms a prominence between the eyelids, it is named *Melon.* It further happens that the Iris may be protruded, not in one, but in several points, and may resemble small nodules, and then it is called *Staphyloma racemosum.* In this disorder, therefore, either one or several tubercles, for the most part of a brown colour, are prominent over the surface of the Cornea. These prominent tubercles have a variable situation on the Cornea; at first, they generally increase a little, but afterwards they do not increase in size, and they become hard. The Cornea around the base of the protrusion is rendered opake, and presents, as it were, a whitish circle. But the pupil is rendered narrow, and, towards that place which is occupied by the staphylomatous protrusion, it is divided, and is sometimes seen entirely closed.

§ 631. Staphyloma of the Iris always proceeds from *prolapsus,* or protrusion of this membrane too long protracted.

For as often as the *prolapsus* of the Iris is not replaced, the prominent portion of this membrane gradually degenerates, and, becoming adherent with the Cornea, no longer admits of being replaced. But in order that the Iris may be protruded through the Cornea, the latter tunic must in all cases have been perforated in some part. The modes in which perforations of the Cornea are produced are various. In the *first* place, frequently ulcers of the Cornea penetrate through this membrane, and, when this has taken place, the Iris is so much more easily protruded as the ulcer is large, and as it occupies the lower region of the Cornea. In the *second* place, if the Cornea, in the course of blennorrhœal ophthalmia, is perforated in several places, through all these apertures the Iris escapes, and the form called *Staphyloma racemosum* is produced.

Besides ulcers, injuries and wounds of the Cornea may facilitate *prolapsus* of the Iris. These injuries are either accidental or artificial, that is, produced in the course of operation; and among these, the semilunar section of the Cornea in the operation of extraction of cataract, we ought particularly to mention. When in this case the wound is large, the form of Staphyloma called *Melon* sometimes ensues.

§ 632. The prognosis of this disease, so far as its removal is to be admitted as in all cases certain, may be represented as favourable. In that spot, however, in which was the seat of the *prolapsus*, a cicatrix or scar causing deformity in all instances is left. The greater is the prolapse, the larger the cicatrix usually is left. With reference to the function of the eye, the prognosis depends upon the condition of the pupil. If perchance the pupil remains closed or remarkably constricted, vision is either entirely destroyed or very much enfeebled. On the contrary, when a considerable opening in the pupil remains, the function of the eye suffers scarcely any detriment. In the case of *Staphyloma racemosum* of the Iris, vision can never again be restored; even the figure of the eye also continues, in all cases, in a great degree altered.

§ 633. Of Staphyloma of the Iris, in so far as it constitutes a peculiar disease, and consequently exists unattended by inflammation, the treatment is to be conducted in various modes. In those instances in which the disposition of the eye tends to a varicose condition, the use of caustic remedies is indicated. To a case of *Staphyloma Iridis* of recent origin, the nitrate of silver, and to that which is more insensible, the chloride of antimony ought to be applied. The eschar, which is in this manner produced on the protruded Iris having dropped off, the application of caustic agents is repeated so long, until all prominence is removed, and a cicatrix upon the Cornea has been formed.

In those instances of this disorder, in which a varicose state of the vessels of the conjunctiva is at the same time present, *Staphyloma Iridis*, both simple and in the form called *racemosum* are most safely removed, if the tumour is cut off by the knife at the base, and the patient is treated as after the operation for extraction of the cataract.

Art. III.—*Renewed Inquiries concerning the Spiral Structure of Muscle, with Observations on the Muscularity of Cilia.* By Martin Barry, M.D., F.R.S.[1] (From the Philosophical Magazine for August 1852.)

[These renewed examinations of muscle, extending over a period of many months, were made in the house of the veteran Purkinje, whose judgment in the matter may be inferred, when it is stated, that,—after what he had seen during that long period of almost daily demonstrations by the author, and the devotion of whole mornings to the subject with almost every kind of muscle that could be obtained,—he translated an account of the same into German, printing no fewer than sixty-eight pages.]

Deprived for years of the pleasure of microscopic research by an affection of his sight, the author finds himself in this respect so far restored, that it does not appear necessary to deny himself that pleasure any longer. If he has erred in taking up the microscope again, that is to say, should his sight be thereby injured, he thinks he may well claim to be excused.

For it could not be to him a matter of indifference that his researches on the structure of muscle had not met with the attention he had expected, and which the subject well deserves. He therefore felt driven to renewed research; and, after nine months of still more rigid investigation, does not find occasion to give up his former views. So far from this, indeed, his opinion that muscle has no other than a spiral structure, has been even more confirmed. He has met with unexpected states of interlacement, throwing new light upon the whole, and now understands how it was that observers did not see what he has seen. The attention of some at least appears to have been given so exclusively to one or to another of those states of interlacement, that they remained, as it were, at different stages in their attempts at explanation. Probably his double spiral fibril appeared to most observers too complicated, perhaps too artificial. Now, however, having found and figured transition stages extending to complete relaxation, he hopes that there will be some at least disposed to repeat their examinations, and with more minuteness than before. Then, perhaps, justice may be done to the author's views, instead of having assigned to them the mournful honour of figuring somewhere in history as opinions or even errors. The objects are of extreme minuteness, requiring, almost without exception, the highest magnifying powers; and they are optically so complicated, that nowhere in the field of microscopic observation is there a subject more difficult than that of muscle.

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[1] Communicated by the author; being the substance of a paper translated into German by Professor Purkinje, Foreign Member R. S., and by him communicated to Müller's *Archiv*, Heft vi., 1850.

The principal facts made known by the author in the Philosophical Transactions of the Royal Society for 1842, briefly recapitulated, were these:—The muscular fibril consists of two spiral threads, so interlaced as to present a double cylinder, *i. e.*, the fibril appears as if grooved on each side, a transverse section of the fibril being represented by the figure (∞). The fibril of a primitive fasciculus having transverse striæ is usually so situated, that one of its edges is directed towards the eye of the observer; whence it comes that usually there is seen the spiral of only one of the cylinders of the fibril. A muscle is thus nothing less than a vast bundle of spirals, appearing short and thick in contraction, long and thin in relaxation. The elliptical winds of the spirals appear to have been mistaken by some observers for "beads," "segments," or "particles." The dark *longitudinal* striæ of the primitive fasciculus are spaces (probably occupied by a lubricating fluid) between the edges of the fibrils. The dark *transverse* striæ are rows of spaces between the winds of the spiral threads constituting the fibrils. If the dark longitudinal striæ are spaces between the edges of the fibrils, the light longitudinal striæ are the edges themselves of the fibrils; and if the dark transverse striæ are rows of spaces between the curves of spiral threads, the light transverse striæ are of course the visible portions themselves of these spiral threads. The contraction of muscle does not require a flattening of "segments" or "particles," as supposed by some, but simply a more transverse direction of the spirals in their curves. Hence, in contraction, the striæ of a fasciculus are narrow, and in relaxation they are broad, denoting a shortening and lengthening respectively of the fibrils. "Transverse cleavage" of the primitive fasciculus is caused by the spirals giving way at that part where they offer the least resistance, viz., at the part where they cross one another and are in contact. The sarcolemma arises from the coalescence of spirals.

It was by attending to the history of development of muscle, chiefly in the larva of the large toad of Jersey, that the author arrived at a knowledge of the foregoing facts. His observations, published in the present paper, were made with one of the large compound microscopes of Plössl; and it happened that the instrument was the very last constructed by that justly-renowned optician. The following are some of the new facts herewith observed; others will be mentioned further on.

The two spirals, of which the muscular fibril consists, run in the same direction, and not in opposite directions, as the author at first supposed. The two spirals are so arranged, that the adjoining coils of each run within the coils of the other.

These two spirals are united at the end of the fibril, as in a loop. Such at least is the case in one form of muscle, and, from analogy, it may be presumed to be the same in others.

The fibril, being thus a double or twin spiral, undergoes a stronger twisting in contraction, and an untwisting in relaxation.

When met with in relaxation, the two spirals usually present themselves in a state comparable to that of common twine.

Between the untwisting in relaxation, and the twisting in contraction, there are several intermediate states. Fig. 3 presents four such intermediate states seen in different parts of the same fibril.

Cilia, also, are double spiral threads, and thus have a structure like that of the muscular fibril.

The author then describes models of lead wire which he has constructed for the purpose of illustrating the structure of the muscular fibril, fig. 1. These models, though very rude ones, may afford some idea of the different conditions of the fibril in regard to length, breadth, and thickness, in different degrees of contraction, *a*, and relaxation, *b*. (*b*, in the model, fig. 1, represents part of *a*, after the drawing of the latter out.[1])

It is an error to suppose it possible to learn how the striæ in muscle are produced, by examining merely the primitive fasciculus. The primitive fasciculus must be, as far as possible, teased out with needles, and the fibrillæ separately examined. To obtain the fibril, muscle should be selected in which the primitive fasciculi are small. For this purpose the heart is especially to be recommended; because, from the ever-active condition of that organ, its muscle is in a state which he regards as that of continued renewal; and the fibrils are not so very difficult to separate from one another. In no heart that the author has examined are the fibrils seen with more distinctness to be double spirals than in the heart of the common frog. He has frequently found such states of the fibril as those in fig. 2, and fig. 3 *f*, to be seen with remarkable distinctness in muscle from the tail of the Crawfish, *Astacus fluviatilis*. The observer should use for examination the muscle of a healthy animal just killed, and never employ muscle that has been preserved in spirit or in any other fluid. The least degree of decomposition is sufficient to destroy the spirals. Decomposing muscle presents granulated threads enough (fig. 6, *b*), *i. e.*, rows of cell-germs, but rarely any trace of spirals. (From this it is seen, and it is important to observe, that the spiral threads are more easy of decomposition, and disappear sooner than the formative cell-germs.)

The accustomed eye can often discern spirals without a chemical reagent; but for those unacquainted with them a reagent is essential. The author provides two solutions; the first a solution containing $\frac{1}{200}$th of corrosive sublimate in spirit of 0·940 sp. gr., and the second a concentrated solution of corrosive sublimate in distilled water. Having placed a drop of the first of these solutions upon glass, he introduces into it a minute portion of muscle from the heart of the frog, and *immediately* proceeds to carefully spread it out with needles. He then separates longitudinally a portion as minute as possible from the rest, and teases this out in the same drop under a lens *to the very utmost.* The threads thus prepared he removes to another strip of glass upon which he had placed a drop of the solution No. 2, covers them with a bit of the thinnest glass, and views them under the microscope: at first with a power of about 200 diameters, in order to select the threads best adapted for observation, and bring them into the middle of the field of view. He then applies a power of about 600, and usually finds here and there a fibril sufficiently separated from the rest at the edge of the preparation to enable him to discern its spirals. It is not unimportant to remark, that the muscle must always be first teased out in the solution No. 1, before it is introduced into the solution No. 2; for, besides corroding the needles, and making them quite useless, the solution No. 2 instantly renders the substance of the muscle so compact, that teasing of it out is absolutely impossible. Even the solution No. 1 lays hold of the muscle to a certain extent, so that the observer should proceed as soon as possible to apply the needles. It it be desired to make preparations that are to be preserved for any length of time, the concentrated aqueous solution of corrosive sublimate (solution No. 2) of course cannot be employed, as the fibrils become speedily decomposed and indistinct. For such preparations the author prefers a solution containing $\frac{1}{120}$th of nitrate of silver in distilled water, using this instead of the solution No. 2, but having proceeded as before with the teasing out in solution No. 1. It is true that the nitrate of silver does not shew the spirals with the same remarkable distinctness as the solution No. 2, and besides, the preparation is here and there defaced with a precipitate; but for preparations to be preserved for any length of time, it is to be preferred. For immediate examination the author especially recommends the solution No. 2.

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[1] [Such models have since been presented to the Royal Society and to the Royal College of Surgeons in London by the Author.—May 1852.]

The use of chemical reagents having been objected to, it may be replied, as suggested to the author by his brother, J. T. Barry, were any one *denying* the existence of the structure in question, then it might be very proper to object, that reagents had destroyed it; but when the existence of that structure is *affirmed*, it cannot be objected that that structure has arisen through those reagents, especially when, in order to bring it into view, substances so very different have been used, as corrosive sublimate, nitrate of silver, and chromic acid. Least of all can those object to the use of chemical reagents who in such researches employ maceration, which, as is known, does not require much time to produce in organic substance the greatest changes.

Adhering to his original views regarding the situations of the striæ in the fasciculus of muscle, as above quoted, the author gives figures illustrative of the same (figs. 4 and 5). These shew the situations of the dark longitudinal striæ to correspond to the spaces between the edges of the fibrils, and the situations of the dark transverse striæ to correspond to the crossing places of the winds of the spirals. It is obvious from the same figures that both the longitudinal and transverse striæ are produced by the refraction of light; for at the very part where the dark striæ present themselves, the rays from the mirror of the microscope fall upon oblique surfaces, where they are diverted from their direct course and do not reach the eye. The dark longitudinal striæ are produced by the cylindrical form of the elementary muscular threads, and the dark transverse striæ arise partly from the same cylindrical form of the muscular threads, but chiefly from the oblique direction of the same at their crossing.

Had observers paid due attention to the history of development, they could not have failed to observe a pellucid gelatinous substance to which the author has given a name suggested to him by Professor Owen, that of hyaline; a name descriptive of the appearance only, though the substance evidently performs functions rendering it in importance second to none. In muscle, this substance, hyaline, is often found within the winds of the spiral threads; often the fibril is enclosed within a cylinder of hyaline, fig. 3. It is very important to be aware of the little difference in refractive power between the hyaline and the substance of the spirals, whereby the outline of the latter becomes almost invisible. This is especially the case when the fibril still lies in the primitive fasciculus, and even occurs after its separation from it. Hence the different views taken by observers of the fibril, especially that assigning to it a structure comparable to a row of varicosities or beads. It is therefore equally important to apply reagents that will serve to introduce a greater difference in the refractive power of the two substances in question, and thus diminish the misleading influence of the hyaline.

This hyaline appears in another way to have misled observers. Where contained within the winds of spiral threads, fig. 6 *a*, it holds together a row of cell-germs; which cell-germs, on the wearing out as contractors of the old spiral threads, give the material for new ones. And some observers, overlooking the spiral threads, probably mistook such rows of cell-germs for fibrils. This mistake is very likely to be made when the muscle has undergone a slight degree of decomposition, fig. 6 *b*, whereby the spiral threads dissolve and disappear sooner, leaving exposed the axis of hyaline, with its row of cell-germs. Prof. Bowman appears to have figured such an axis of hyaline containing cell-germs as a fibril.[1] It may appear absurd to suppose that any doubt on such a matter can be entertained; and yet, since the mistake in question has been made, the author ventures to ask physiologists which appears to them the more probable: that spirals are formed first in order to produce cell-germs (!), or that cell-germs are first formed in order that they may give origin to spirals? *c* and *d* in fig. 6, shew division and subdivision of the cell-germs for the production of minuter spirals. It must be admitted that the changes in the structure of the fibrils, attending their continued composition or decomposition, present a series of transition states such as may mislead all engaged in this most difficult field of observation.

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[1] Cyclopædia of Anatomy and Physiology, article "Muscle and Muscular Contraction," fig. 287 *c*. In his earlier work, Phil. Trans. 1840, no such figure is to be found.

It is known that in some states the primitive fasciculi during manipulation break off short, that is transversely, and that in other states they divide in a longitudinal direction; but it is not known on what this difference depends. The author explains it thus:—He finds the tendency to transverse cleavage to be in proportion to the amount of contraction the muscle happens to be in at the time of manipulation, while relaxation in the same proportion causes the giving way in a longitudinal direction; and he offers the following as perhaps sufficient to account for the difference. In contraction, where the transverse striæ are narrow, the spirals cross each other (*i.e.* antagonize each other) at the acutest angles; and in such a state of course it is that there occurs most easily a mutual *cutting through*, producing the "discs" of Bowman, to be again referred to. On the other hand, in relaxation the spirals meet only at obtuse angles, whereby the tendency to cutting through is in proportion lessened. The cutting through of the spirals when crossing at acute angles is illustrated by reference to a play with twine, familiar to school-boys.

In the early stages of development, however, fasciculi are sometimes met with in which the fibrillæ are so surrounded with large spirals, that longitudinal cleavage would be difficult however complete the relaxation. Of such large spirals, not merely two, but many interlace—each surrounding its own cluster of fibrils. These large spirals pass into membrane and form septa.[1] Now, within the winds of the larger spirals there arise smaller ones, which in their turn enlarge and pass into membrane, to be succeeded by another generation, and so on; by which it is easy to understand the prevention of longitudinal cleavage, as well indeed as the difficulty constantly met with when endeavouring to obtain separate fibrils for microscopic examination. Again, the state of the primitive fasciculus in fig. 7 was met with; where the fibrillæ, *c*, were shared by more than one surrounding spiral, *b*; the whole being surrounded by a larger spiral *a*. Here also cleavage in a longitudinal direction would be very difficult. Further, the author saw states in which there was absolutely no cleavage, the fasciculus before breaking off becoming tapered to a point, fig. 8. This tapering to a point seemed referrible partly to great distensibility of the sarcolemma, and partly to a loose condition of fibrils already somewhat relaxed; and it is beautifully demonstrative of a spiral structure. (In the figure, upon comparing the direction of the curves of the spirals at *a* with that at *b*.) (The direction of the small spirals is opposite, in one sense, to that of the large general spiral. From the lower end the small spirals run from left to right in front of the fasciculi. The large spiral runs from its lower end from right to left in front of the bundle, but from left to right behind it.) Besides, at *a* the fasciculus was thick, while at *b* it was thin; and as the spirals became more and more drawn out, the fasciculus became more and more thin, until it terminated in a point. (The arrow shews the longitudinal direction of the fasciculus.)

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[1] Bowman observed that the inner surface of the sarcolemma often presented irregularities, which the author thinks were no other than remains of septa, such as those above mentioned.

It not rarely happens in the breaking off of twine, in which the two threads composing it are of unequal extensibility, that one of them is more drawn out than the other, which becomes coiled around it as around an axis. Such a state being not unfrequently presented by twine-like muscular fibrils, fig. 9, after the breaking of them up with needles, it is important that the observer should be aware how the appearance is produced; for it may easily mislead him into the belief that he sees a row of alternately longer and shorter "beads."

The author is convinced that, with the exception of one case already mentioned (fig. 6 *b*), in all instances where Prof. Bowman speaks of fibrils, he had before him, without recognising them, nothing less than spirals. "Very reluctantly," says the author, "should I again enter into a controversy with a fellow-countryman whom I much esteem, were I not sure that his desire to arrive at the truth in this matter is quite equal to my own." He then gives copies of five of Bowman's figures, fig. 10 *a*, *b*, *c*, *d*, *e*, placing beside them five corresponding figures of his own, fig, 11 *a*, *b*, *c*, *d*, *e*, and shewing the former to be, not, as supposed by Bowman, rows of beads, but different states of double spirals. No doubt, it is added, Bowman's fibrils had undergone some change; for three out of five of the preparations from which they were drawn had been preserved in spirit, while the fourth had been exposed to maceration.

What the author states of Bowman's figures of fibrils applies equally to the drawings given by that physiologist of fasciculi, though the latter are on a smaller scale. And no one, he thinks, who will take the trouble carefully to compare Bowman's figures 39 and 40, in his memoir, Phil. Trans. 1840, as well as those in his (Bowman's) plate 19, in the same memoir, with what has been said in the present paper of the change in breadth of the transverse striæ in consequence of the difference in direction of the winds of the crossing spirals, will refuse to admit that the latter serves fully to explain the former.

We are indebted to Bowman for representations of manifold appearances presented by primitive fasciculi during their contraction and expansion, though from being unacquainted with the spiral structure of muscle he could not explain them, and wisely avoided the attempt to do so, except that he sought to refer the approach towards, and withdrawal from one another of the transverse striæ, to contraction and expansion of his supposed "discs."

But what are these "discs" of Bowman? Certainly not what he thinks, layers of muscular substance, "primitive component particles," an assemblage of which constitutes the primitive fasciculus. Bowman's discs are really nothing else than the bright parts of the transverse striæ, in which the single winds of the spiral threads are arranged in adjacent order (fig. 5 *a*, *a*, *a*), and as it were, into "*étages*" or series. (See fig. 12, where one of these "*étages*," the lowest, is separated from the rest by the cutting of the spirals at their points of crossing.) The dark places in the transverse striæ correspond to those separating Bowman's discs. They are nothing else than the crossing places of the spiral threads. Here the latter come into immediate contact with one another—can with pressure be made to exercise a cutting power—and, as before said, actually to cut each other through. This, too, must take place more or less in stories or "*étages*," as the points of crossing are for the most part on the same level. And when the cutting through has taken place, each story or "*étage*" represents one of Bowman's discs.[1] (The author here points out a difference between merely perspective crossing of the spirals, and that crossing where they are in contact; it being of course at the latter only that there can be a cutting through.)

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[1] This, however, is not always the case; for at different parts in the breadth of the same primitive fasciculus the fibrils may be in different degrees of contraction, and their points of crossing therefore on different levels. In such states the transverse striæ, viewed with changes of focal distance, are seen to change their place continually, according as viewed near the periphery or at greater depth, as was observed by Bowman, and as every experienced microscopic observer must have noticed.

Whence comes it that, as was observed by Bowman, contraction at any part of the primitive fasciculus (characterised as this is by greater nearness of the transverse striæ) is attended, both before and behind that part, in the longitudinal direction, with a separation of the transverse striæ? The cause, according to the author, is simply this: when the spiral threads extend more in a transverse direction at one point than at another, this can take place in no other way than at the expense in the longitudinal direction of their continuations, the winds or loops of which, thereby drawn out of the transverse direction, assume one that is more longitudinal.

Bowman is right in maintaining that contraction of the primitive fasciculus has nothing to do with zigzag inflexions of the same. On the contrary, as Bowman remarks, it has been shewn by Owen that it is in *relaxation* that these zigzag inflexions may arise; and not only so, but that in the Filaria they are regularly present in relaxation, being there indeed characteristic of the relaxed state of muscle. The author inquires, How then does it happen that such zigzag inflexions may arise in relaxation? He thinks it may possibly be in the following manner:—Suppose the extreme ends of the primitive fasciculus through any hindrance to remain fixed, and that the fibrillæ, after cessation of the influence of the contractile foree, strive by means of their own elasticity, and in consequence of the relaxation of their spiral threads, to gain a greater length; but being prevented from doing so by the hindrance above supposed at their ends, they seek to gain that greater length through lateral inflexions, which in such a case must produce a zigzag form. Were an antagonizing force applied, the elongation could follow without the formation of such zigzags.

We are indebted to Professor Bowman for many microscopic measurements of the primitive fasciculi in different classes of animals. He found the largest in Fishes; they had a less size in the Amphibia, were smaller in Mammals, and smallest in Birds. Bowman's measurements are very numerous, and were no doubt made with the greatest care. He has, however, omitted to draw general conclusions therefrom, and makes no remarks as to the cause of those differences in size. The author in this respect follows the example of Professor Bowman. He brings forward no general conclusions of his own on the subject, and indeed for this reason: because he thinks that we ought first to have determined the mean size of the primitive fasciculi in the same individual as well as in different individuals of the same species, according to their different manifestations of activity, before we undertake to draw general conclusions. Yet he cannot refrain from here pointing to the following fact, mentioned in a former part of his memoir. According to his observations, the primitive fasciculi are at first merely double spirals, *i. e.*, they are no other than fibrils. The metamorphosis of fibrils into primitive fasciculi is especially observable in the heart, where the young fasciculi are found, at first flat and scarcely broader than the fibrils themselves. The cause of these continued changes in the muscle of the heart, as already said, it may well be supposed is no other than the ceaseless activity of that organ. Scarcely is it to be doubted that the same thing takes place in other muscle also, though more slowly. (Certain muscles are then referred to as affording examples of great activity, and it is remarked that in different individuals of the human race the primitive fasciculi in the muscle of certain parts are probably unusually small.) Hence it occurred to the author to offer the following remarks concerning the measurements of Bowman. In Fishes the primitive fasciculi were found the largest, because of the low degree of muscular activity required in the element in which they live (though perhaps the muscles of the fins and gills may be here excepted; and it is known that they present even externally an appearance different from that of the other muscles). In Birds, on the contrary, the primitive fasciculi were found in the smallest, as was to be expected from the high degree of muscular activity of this class. Amphibia and Mammals presented a middle average size, from their muscular activity occupying a middle place; but here it must be remarked, that striking differences would certainly have been met with had Bowman's researches been of a more special kind; for it is probable that the salamanders and other naked Amphibia would have presented still larger fasciculi than even Fishes.

Schwann was the first to make us acquainted with the existence of the sarcolemma. An independent discovery of it was made by Bowman, to whom it is that we are indebted for an exact description of that structure and an appropriate name. Its mode of formation out of spirally-arranged cells, the author believes to have been first seen and published by himself. That mode of formation of the sarcolemma appears to be as follows:—At *a*, fig. 13, is a coil of young cells (once a column of compound cytoblast, as at fig. 20 *c*). *a*, in fig. 13, is a drawing from nature; *b* in the same figure is a diagram. *a* passes into *b*. That the spirals really do consist of cells is seen from fig. 14, a drawing from nature, in which *a* represents a large double spiral from the tail of the tadpole when very young, and *b* the remains of a similar double spiral after the addition of acetic acid. The acid removed the coalesced membranes of the cells, of which the double spiral *a* was composed, and left the nuclei behind in double spiral order. At *c* is seen the structure of one of those nuclei. They contained the elements of division, by which division the spirals pass into the state of membrane. And fig. 15, also from nature, shews such division to have taken place; this figure representing a stage in the formation of the sarcolemma.

With regard to the function performed by the sarcolemma, no definite opinion appears to have been given. The author believes that its function depends on elasticity. As the walls of the sarcolemma-cylinder are distended during the contraction of the double spiral threads, they return inwards as soon as relaxation comes on. And it is in this manner that the active relaxation of the fasciculus of muscle is to be explained.

Muscle from the thigh of the grasshopper (of which many individuals, including several species, were examined,) having uniformly presented a relaxed state nearly approaching to that in fig. 16 (which, however, is merely a diagram), it appeared to the author probable that such a state was not unconnected with the sudden muscular contractions required by this creature for its leaps. A sudden change from such a state of relaxation to that of extreme contraction must here take place with the greatest facility, and be combined with the manifestation of great power. This opinion having been mentioned to Professor Purkinje, the latter recommended the author to examine the corresponding muscle from the Flea, in which, from its enormous leaps, something similar would, he thought, be found. The author, accordingly, examined some of these, and had the satisfaction to find in them a degree of muscular relaxation even higher than that he had observed in the grasshopper. In the two figures, fig. 16 and fig. 5, the parts in fig. 16, marked *b*, *b*, correspond to *b*′, *b*′, in fig. 5. From a comparison of these two figures, it will be at once seen how the extended *b*, *b*, in fig. 16, pass in contraction into the narrower *b*′, *b*′, fig. 5. Similar conditions no doubt exist in other animals, but perhaps nowhere are they more remarkable and constant than in those just mentioned. The observation may possibly induce some to bestow their attention upon this subject, when examining leaping insects as well as other animals.

The author repeats a drawing he gave in the Phil. Trans. for 1842, of an artery from the *pia mater* of the Rabbit, fig. 17, of which the following is an explanation :—*a*, longitudinal muscular fibrils, represented merely by rows of dots, except a single one on the left side, in which is shewn the double spiral; *b*, outline of a fibril surrounding the longitudinal ones; *c*, double spiral structure of *b; d*, blood-corpuscles, for the most part young and very small; *e*, a line denoting the inner membrane of the artery. He then gives a figure, fig. 18, representing more distinctly the double spiral structure of such a fibril as *b*, in fig. 17.

His observations on the history of development of muscle are given in detail, with many illustrative drawings; but as only a part of the latter can be given in this abstract, it is not intended to offer here more than the substance of the principal facts he observed, which were as follows :—

Cells having arranged themselves as at *a*, fig. 19, and their membranes having passed through the states *b* and *c* in the same figure, and a tube having been thus formed (stages known to other observers,) columns of compound cytoblasts are seen within the tube, fig. 20, *b*, *c*; which cytoblasts have descended by division from the nuclei of the primitive cells, fig. 19, *a*. (The compound cytoblasts in these columns are arranged with such regularity, as to produce, and explain the nature of, the striæ seen by Schwann, fig. 20 *a*.) The membrane of the tube disappears, not forming, as Schwann thought, a permanent sarcolemma; and the columns of compound cytoblasts having passed into coils of cells, fig. 13, *a*, a spiral is formed of them, as shewn by the diagram *b* in the latter figure. A central row of cell-germs is left for the formation of future spirals; and the spiral first formed divides, and, as above shewn, passes into membrane, —the first sarcolemma. Such future spirals in a far later stage are seen in fig. 21; and fig. 22, *a*, *b*, *c*, shews the way in which the cell-germs perpetuate themselves by division and subdivision, every spiral having within its winds the elements of reproduction, fig. 23; and the primitive fasciculus being often found to have preserved cell-germs for a more general purpose in a central line, fig. 21. The reproduction of muscle, when fully formed, is probably no other than a continuation of its history of development, and has been already illustrated in fig. 6. By self-division of its hyaline axis of cell-germs, every fibril may become converted into a primitive fasciculus.

The laws of development in general are best studied in the ovum; and he who holds the wondrous process of cell-formation in the germinal vesicle, *i. e.*, the history of development of the germinal spot described by the author in the Philosophical Transactions for 1840, as undeserving of particular attention, may spare himself the trouble of inquiring into the history of development of muscle, or that of any other tissue, as his labour would be thrown away. In that development of the germinal spot, the hyaline in the centre of the spot is obviously the prime mover. It is the hyaline in the centre of the germinal spot that is the substance undergoing fecundation; and no doubt it is the hyaline seen in the head-like extremity of the spermatozoon that is the real fecundating substance. (The author once saw, and figured in the Philosophical Transactions for 1840, what appeared to him to be a spermatozoon in the very act of entering the ovum of the rabbit; its head having already penetrated an orifice discernible for a time in the *zona pellucida*.[1]) In the ovum of the rabbit, after fecundation, the germinal vesicle returns to the centre of the ovum, and the fecundated hyaline passes to the centre of the germinal vesicle. This hyaline, in consequence of fecundation, now contains substances of two kinds,—one from the female ovum, the other from the male fecundating fluid. Through a process operating in the germinal vesicle before fecundation, the hyaline of the ovum had prepared a sort of pabulum,—minute globules of hyaline. With this pabulum, the new hyaline, a compound of male and female elements, proceeds to nourish itself; or, in other words, proceeds to assimilate the contents of the germinal vesicle, whereby there arises a material for the formation of two cell-germs into which it divides. These two cell-germs grow at the expense of the remaining contents of the germinal vesicle, which are nutrimental cells, until the whole are consumed. The membrane of the germinal vesicle, the mother-cell of the whole body, has now disappeared, and there are seen in the place of that vesicle two young cells, which together constitute the new organic being. How shall we designate the hyaline of this new being? If we call the hyaline of the ovum, hyaline No. 1, and that from the fecundating substance, hyaline No. 2, we have in the new organic being, hyaline No. 3. No. 1 denotes the maternal hyaline, No. 2 the paternal fecundating substance, and No. 3 composed of the first and second, the hyaline of the offspring. Hence it is that the offspring comes to resemble both parents; for, be the resemblance effected as it may, the so compounded hyaline of the offspring will never lose a constitution inherited partly from the father and partly from the mother. And how does the hyaline of the offspring now begin to propagate itself, so that at last a creature shall arise out of it, in stature and other peculiarities like the parents? This is effected by self-division and repeated self-division. Each of the two cells just mentioned, together constituting the new organic being, becomes in its turn a mother-cell, so that now there are four; and in like manner there arise 8, 16, and so on, until the whole assumes the appearance of a mulberry. In the centre of this mulberry-like aggregate of cells there now appears one larger than the rest, like a queen-bee in the hive. This is the only cell in the group that has an enduring existence, *i. e.* in its progeny; all the others serve but a temporary purpose. (We thus have a sort of aristocracy of cells! first manifesting itself in the two above-mentioned as arising in the germinal vesicle, and nourished at the expense of all the surrounding cells.) This large cell now moves from the centre of the ovum towards the periphery, and here takes a fixed station. The hyaline nucleus of this cell is now to be considered as the most peculiar germ of the whole organism. Out of the nucleus of this cell, after many intermediate stages of formation, there at length arises the "primitive trace," and Von Baer's "chorda dorsalis." For other details, the author refers to his researches published in the Philosophical Transactions for 1839 and 1840; not deeming it suitable to the purpose of the present paper to add more, than that the process through which the first and continually repeated self-division of the hyaline is effected, is no other than a repetition of the same process which operates in the germinal spot of the germinal vesicle, as the original cell of the organism; in which process the operation of certain functions required for an increase of substance is implied, viz. absorption, assimilation, and secretion. In the cells thus descending from the original mother-cell down to the remotest generation, it is evident that the same wondrous process is repeated, the same increase of the hyaline; which at first takes a peripheral station in the cell in order through absorption to be newly fecundated (for what in this case is absorption, but the fecundation of the hyaline of the cell through a relatively external substance maintaining the process of division?) Then, after fecundation at the periphery, the hyaline passes into the middle of the cell, there again to divide into new generations of cells, which finally arrange themselves so as to form the various tissues of the organism. But the germinal spot process continues even here. (Compare the contents of the cell in fig. 19 *a*, with the author's delineations of the contents of the germinal vesicle, Phil. Trans. 1840, Plate XXII. figs. 159, 160, 162 *c*.)

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[1] He mentions having repeatedly found unaltered spermatozoa in the interior of the ovum in its next stages, after it had passed into the Fallopian tube; and having had the opportunity of shewing them to Professor Owen, who declared himself fully convinced of the presence of the spermatozoa within the ovum. Once the author counted as many as seven in a single ovum. (A drawing of that ovum will be found in a paper by him "On Fissiparous Generation," in the Edinburgh New Philosophical Journal, October 1843.) In all instances, the spermatozoa were motionless, and not among the cells in which the development of the essential substance was proceeding, but in the colourless fluid between those cells and in the *zona pellucida*. [While passing through London in May 1852, the author learns, that, after the lapse of many years, these observations have been in two quarters confirmed by others; Dr Nelson having presented to the Royal Society a paper announcing the presence of spermatozoa in the interior of the ovum of a creature at the other end of the animal kingdom, *Ascaris mystax*; and Mr Newport having added a postscript to a paper of his on the ovum of the frog, also presented to the Royal Society, in which he candidly acknowledges having erred when, in a former memoir, he questioned the accuracy of the discovery made by the author of the present paper, that entire spermatozoa do actually make their way into the interior of the ovum.]

Every one who has noticed the author's drawings of a certain state of the two cells succeeding the germinal vesicle, must have been struck with the resemblance they bear to corpuscles of the blood. He deems it important in this place to refer to observations he long since published, that both have the same destination; through both these structures, as well the blood-corpuscles as the cells of the ovum, it is intended to reproduce the hyaline,—the one being floating, and the other fixed centres of that process of assimilation which effects the reproduction of the hyaline. The germinal vesicle may be regarded as a living being; and every blood-corpuscle as one of the progeny of the germinal vesicle, reproducing itself, as that vesicle itself does, by division of its fecundated hyaline. We may consider the blood-corpuscles as a floating shoal of Infusoria, receiving as their nourishment the chyle. So nourished, or rather (as regards their hyaline centres) so fecundated, the blood-corpuscles repeat in their interior the whole germinal spot process, since in some of them there proceeds the self-division and repeated self-division of the hyaline, whereby new generations of blood-corpuscles arise, which again repeat the same process; while others deposit upon the walls of the capillaries their hyaline, which operates with fecundating power upon cells lying in the parenchyma of the organs, and becomes assimilated according to the specific constitution of the same. Sometimes, instead of chyle, as the fecundating substance to be assimilated, there reaches the hyaline of the blood-corpuscles quite another heterogeneous substance, for instance some sort of infectious matter, organic or animal poison, &c., whereby there as surely arise diseased processes of formation, which communicate themselves to the remaining portion of the blood or to the parenchyma of the organs.

The author refers to a full confirmation of his observations on the remarkable process of cell-formation in the germinal vesicle of the mammiferous ovum, by those of Mr H. D. S. Goodsir on a cystic entozoon. And as this lies at the other end of the series of organic existences, the operation of the process in question there, implies its operation in all intermediate ones.

He then notices an objection made to his observations, published in 1839 and 1840, when making known the fact that cleavage takes place in the *mammiferous* ovum also,—that such cleavage is effected by means of cells; shewing that inadequate research led to that objection, and concluding his remarks with the following words :—" After having examined 230 ova found in the Fallopian tube, with the sacrifice of 150 rabbits for embryological research, of which rabbits at least a score were devoted to anatomical inspection for the purpose of enabling me to determine the time at which the ovum leaves the ovary,—no man will wonder that I deem myself competent to judge whether the divisions of the germ are, or are not effected by means of cells. No man who does not examine mammiferous ova in large number immediately before their exit from the ovary, or otherwise through observations on animals or plants make himself acquainted with the germinal-spot-process of division, is able to comprehend the formative process in the mammiferous ovum in any of its earlier or later stages, or indeed *to understand the physiology of cells.*[1]"

A former drawing, fig. 13, shews the mode in which a spiral arises out of cells. The following may serve to illustrate the way in which the *twin* or *double* spiral is produced. Every microscopic observer must be familiar with segmented cytoblasts, the annular arrangement of cell-germs in fig. 24, *b*, *c*, *d*. Of such rings of cell-germs, two are sometimes met with, connected like two links of a chain, fig. 25. Let the diagram fig. 26, *c*, represent a pile of such pairs of connected rings. Now rings, such as those in fig. 24, are seen to pass into the state at *h* in the same figure. And this change occurring in each ring of the pile of pairs of rings, fig. 26, *c*, with a uniting at the extremities of rings lying one upon another, would produce the twin or double spiral *d* in the same figure.[1] Nature, it may be objected, is a more skilful architect. She does not first form rings in order afterwards to divide them and unite their extremities in another way. All is from the first arranged in spiral order. Without denying this, and fully admitting that there is from the first a tendency to arrangement in spiral order, the author still maintains that rings of cell-germs are constantly met with ; and that since it is so ordered that spirals shall arise by the union of separate cells, it is in perfect keeping with the form of the cytoblast (fig. 24, *a*), that the germs of those cells, when first seen, should be arranged in the form of rings. [It must not be forgotten that each of the rings entering into the formation of the spiral has its centre of hyaline, whence the cell-germs of the next generation of spirals. See fig. 13.]

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[1] [In the mammiferous ovum there is no substance that can be called a food-yelk. The germ-cells therefore are not there obscured by a surrounding yelk-mass, the cleavage of which they *govern*, as seems to be the case in ova since figured by other observers.]

That which in nutrition is ascribed exclusively to the fibrin of the lymph (and which probably corresponds to the author's hyaline), he believes to be derived from the blood-corpuscles themselves. And it is his opinion, that in the coagulation of the blood Nature gives us an example of the coagulation of the blood-corpuscles ; for, as he shewed in 1842, *many fibres arise through coagulation within those corpuscles ;* whereby the latter either pass entirely into fibres, as in the cytoblast blood-corpuscles of the Mammalia, or the coagulation takes place within blood-cells, as in the other Vertebrata.

As already said, the reproduction of muscle seems to take place by a process not differing essentially from that which formed it, a process of division and subdivision of the germs of cells. And what are these germs of cells ? They consist of nothing less than that wondrous substance hyaline, the unceasing maintenance of which the author believes to be the main purpose in the formation and division of cells. Each central row of cell-germs within the windings of the spiral threads is really an axis-cylinder of hyaline ; and when this divides, there arises a double cylinder, and so on. All these rows of cell-germs, arisen by division and subdivision of the nuclei of the primitive cells which arranged themselves in necklace-like order to form the first muscle tubes, as well as the germs of those primitive cells themselves, are descended through division from those substances in the ovum which again had arisen from the fecundated germinal spot or nucleus of the germinal vesicle.

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[1] [Or suppose a single pile of such bodies as that at *h* in fig. 24. The union of their extremities would produce a single spiral ; and longitudinal division of this single spiral would produce a double one.]

In a brief recapitulation concerning hyaline, the author states his Researches in Embryology, as well as his observations on the Corpuscles of the Blood (Phil. Trans. 1838, 1839, 1840, 1841), to have afforded him abundant opportunity for becoming acquainted with it.[1] He found it in the so-called nucleolus of cells in general, as well as in the germinal spot of the germinal vesicle, to be the point of fecundation,—to be present in the head-like extremity of the spermatozoon,—to constitute as globules, immeasurably minute, the foundation of cytoblasts, these being the real germs of cells. He shewed that this hyaline forms as well the membrane as the contents of the cell,—that to it belong the functions of absorption, assimilation, and secretion,—that so long as the vegetative process is in full activity it never ceases to be in operation, but divides and subdivides to form new cells, or rather to reproduce itself. For in the reproduction of cells, the maintenance, the division, and the increase of the hyaline appears to be the main purpose. It may be asked, What is there, then, in the organic body which is not formed through hyaline? Truly nothing. It is the essentially living substance in the body, the whole organism is the product of its formative force. All cell-germs are really, through repeated self-division, effected by a remarkable assimilative process, descendants of the hyaline of the germinal vesicle, this having been fecundated by a substance from the male; whence the resemblance between the offspring and both its parents. Finally, referring to his observations on the mode of origin and structure of nerve and other tissues, the author adds, that were it not that he would probably be blamed for excessive phantasy, he would not hesitate to declare the hyaline, as the foundation of the centre nucleus of ganglion globules and of the axis-cylinders of nerves, to be the immediate organ of sensation of every kind.

On the Muscularity of Cilia.

As his previous observations had led him to expect, cilia were found to be no other than his twin or double spirals. No man, he thinks, will do him the injustice to suppose he maintains the possibility of discerning a double spiral in the minutest cilium. He is as far from maintaining this as he is from asserting the possibility of seeing a double spiral in the minutest muscular fibril. But he does maintain that those who undertake the examination of cilia in the way in which they should set about the examination of all organic tissues, *i. e.* with a desire to know how they originate, what is the history of their development, will certainly find that the double spiral is the fundamental form of all cilia, the structure of which can be reached with the microscope, and therefore probably of the most minute. Indeed, under favourable circumstances, traces thereof are not so very rarely to be discerned by the accustomed eye, even in the latter.

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[1] See in the Edinb. New Phil. Journ. Oct. 1843, a pape "On Fissiparous Generation;" and in the same Journal, Oct. 1847, another "On the Nucleus of the Animal and Vegetable Cell."

In the author's observations he used several bivalve mollusca, including the oyster, *Ostrea edulis*, and the common sea-mussel, *Mytilus edulis*. The one last mentioned is to be preferred, because of the bars of its branchial laminæ being most easy of separation. And this mussel is further recommended to those disposed to repeat the author's observations, on account of the excellent description of its gills given by Dr Sharpey, in his article "Cilia," in Todd's Cyclopædia of Anatomy and Physiology. He recommends the examination of this mussel when small, because of the branchial laminæ being more transparent than in the larger specimens. He examined some in which the shell measured scarcely two lines in length, they being the smallest he could obtain. The most convenient size, however, he found to be that in which the shell measured in length from half to three-quarters of an inch. Still an examination of the largest should not be omitted.

Convinced by his earlier microscopic labours that it is best to direct the eye for a considerable time exclusively to the same part or set of objects in order to enable it to detect minute differences in the same or in different individuals, the author directed his solely to the branchial laminæ, and here to little more than the sides of those parallel bars of which the branchial laminæ are composed. In this way it was that he became acquainted with the fact, that, as the ever-acting heart requires a continued renewal of its fibrils, so are new generations continually preparing to succeed the indefatigably vibrating cilia.

Before detailing his observations, the author states what others should do who may be disposed to repeat the examinations. A small piece, about a square line, having been cut from the marginal edge of the gill, and placed upon glass, he adds to it a drop of the fluid, which, on the mussel being opened, collects in the shell, gently and to a small extent separates the bars from one another with fine needles, and places them under the microscope without the addition of any covering such as glass or mica. It is soon seen that some of the bars, wedge-like in their transverse sections, present the thicker of their edges to the eye, while others are lying on their sides. Both should be examined with especial reference to the cilia on the two sides of the bar. Of these cilia there are three sets, and not two only, as hitherto supposed; one set uppermost when the thicker edge of the bar is directed towards the eye; the second occupying a middle place; the third lowest.

Concerning these cilia, the author states the following as new facts:—In the *first* place, these cilia—and from analogy, probably all cilia—consist of double spiral threads, and thus have a structure like that of the muscular fibril; *secondly*, the cilia present merely stages in the development of the cilia; *thirdly*, the cilia in the same figures, hitherto either overlooked or held to be identical with the cilia, are really not so,—they are the counterpart thereof. And he then proceeds to establish these three positions in the order here laid down, as follows.

Separated from their localities by manipulation, and strewn through the field of view among the fragments of the gill, are seen simple cells. In the interior of such cells the young cilia are indicated. They push before them the membrane of the cell, so that it appears pointed; and afterwards present themselves of a club-like form.[1] Sometimes this club-like form appears referrible to a provision of plastic substance at the extremity for the lengthening of the cilium, and sometimes to a bending down of the extremity hook-like upon itself. Up to this time the membrane of the cell appears in some instances to continue entire,—the young cilium, though coming into view, being as it were still unborn. At length the membrane is ruptured, and the bent down extremity of the cilium gradually developes and unrolls itself like a young fern, fig. 29. This figure represents part of a large fragment, several of which were found in substance scraped from the gill of the oyster. They contained at the margin numerous cells. The middle space presented none. On the nature of these large fragments the author has for the present nothing further to remark, than that they afforded him an invaluable contribution towards the history of development of cilia; for of that development they presented with distinctness a very early stage. The minute cells in their interior seemed destined to give origin to cilia, which here and there were seen to have been already formed, and to have burst through the membrane of their cells. One of these, the interior of which was seen with rare distinctness, is represented on a larger scale. The young cilium here drawn consisted of two spirals, within the winds of which was a pellucid substance corresponding to that which the author above and elsewhere has termed hyaline. At the extremity the two spirals passed into one another, and were bent over hook-like towards one side. At the base they separated, to bestride, as it were, the contents of the cell in which the cilium had been formed.[1] Perhaps these two separate threads may be considered as the radical ends of the cilium, in which growth first of all takes place somewhat in the following manner:—The extremity of each of these two threads draws into itself new substance from the nucleus of the cell. And now, as the cilium is alternately in the states of twisting and untwisting, it gradually spins up into its substance those after-threads, and in this manner elongates.

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[1] Probably Valentin saw the same stage of development in *Unio pictorum*, where he mentions it (the "club-like form") as an unusual shape ("ausnahmsweiser Gestalt.")—R. Wagner's *Handwörterbuch der Physiologie*, p. 500.

Drawings are then given of stages following those just described. These different appearances evidently denote different degrees of development. [Corresponding differences were noticed in their movements. None of them, however, were in a perfect state; for the movements of even the most advanced were awkward, shewing them to be, as it were, still in their apprenticeship.] Now to all of these cilia, making allowance for differences in the degree of development, may be applied the description just given; though it is only here and there that a trace of connection with the cell can be distinctly seen. The author thinks that no observer can attentively examine such cilia without seeing, as he did, that each of them consists of a double spiral thread, having therefore a structure like that of the muscular fibril, and thus establishing his position No. 1.

The broad cilia, of which examples have been given in Beroë and other ciliograde Mollusca,—where, instead of cilia of usual form and arrangement, there are found rows of broad flat flaps, each of which is said to consist of a row of single cilia,—appear to the author to consist of *fasciculi* of cilia; and if this be the case, their mode of reproduction is probably the same as that of other muscle. He found the bulb at the base of some cilia much smaller than at that of others. This may have arisen from division,—a larger bulb, together with its cilium, dividing into two; or it may have arisen from consumption of the bulb, through nourishment and growth of the cilium. In other cases the bulb had entirely disappeared, and the cilia arose from a common ground. Here it is possible that, after the bulbs had been entirely spent from the growth of the cilia, all trace thereof had disappeared.

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[1] [It will be observed that each of these separate threads is twisted on itself.]

Notwithstanding all that he has said, both in this treatise and in former ones, on the necessity, in all researches on the structure of tissues, of attending to the history of their development, the author adds that he feels called upon candidly to acknowledge cilia to present, in this respect, a difficulty such as perhaps is scarcely to be found elsewhere. Here the observer has it not in his power to *begin* with the history of development; for, after what has been above stated of a continued renewal of the cilia, and of several stages in their development, being sometimes met with even in the same bar, it cannot be expected that the younger cilia will necessarily be found in the younger mussels. The few facts in their development recorded in this memoir, were not fully ascertained until after a long series of measurements and observations on movements, and on forms of cilia met with *quite at random*. The author trusts his descriptions of the several stages may be useful to others in following out the history of development; but it is a misfortune for him not to have it in his power to say just where the younger and most convincing stages are to be found, such as would enable others so easily to confirm his observations on their spiral structure. It is added, "You may open a very large number of mussels, and devote whole days to the examination, before you find an example for demonstration. If, however, you are so fortunate as to meet with a stage such as that in fig. 30, you feel richly rewarded for all the labour."

The author then proceeds to establish his position No. 2, that the cilia are merely different stages in development of the cilia in the same figures. To this unexpected observation he was led by the following facts.

In the *first* place, the cilia have a common place of origin, their roots arising mixed together in the same field. *Secondly*, you here and there see one of the cilia flexed at its base, by which its extremity is made to approach the extremities of the cilia *n;* but it instantly returns to its previous state, to be immediately afterwards depressed again as before; and so on.[1] *Thirdly*, You sometimes meet with states in which this depression of some of the cilia *m* is permanent. See *m'* in the same figure. *Fourthly*, As already mentioned, the cilia *m* in different individuals present very different states, figs. 31, 32, 33, 34, 39, 40. Their lengths differ, some being very short; sometimes they are straight, sometimes curved; sometimes they are found moving, sometimes motionless. The movements are generally quite irregular. There is nothing like a common purpose in them; certainly no combination for the production of a current. In some they are such as to suggest the idea of efforts to become unbent at their extremities, fig. 32; and in others no longer bent at their extremities, the movements seem made for the purpose of becoming elongated, fig. 40. You sometimes meet with the two last-mentioned states in the same bar, fig. 39. In short, these different appearances and movements evidently denote different degrees of development. Not until they reach the state in fig. 36 can the cilia *m* be said to have attained maturity, and to exhibit a common purpose in their movements. But even then their movements are not so vehement as to be likely soon to wear them out. Why, then, are they so constantly renewed? The fact is, that by flexion at the base, the cilia *m* (see fig. 36) pass, one after another, into the vehemently vibrating cilia *n*, which they succeed as a later generation. For this purpose they are formed, and then for the first time do they perform really efficient action. Thus it was that the author was led to his position No. 2.

In his third conclusion, he stated that the cilia *o* in fig. 36, &c., hitherto either overlooked or held to be identical with the cilia *n*, are really not so,—they are the counterpart thereof. This will be immediately made clear if attention be paid to their origin, and the function they perform.

The roots of these two lines of cilia are separated by a broad pellucid space, fig. 36 *h*, in which are no cells such as those (*p*) giving origin to the cilia in question. The cilia or the two lines, proceeding from opposite sides of the pellucid space, arch over it, their extremities meeting in the middle line, where they, alternating with one another, like the fingers of the two hands, form a sort of tunnel, through which water is driven by their vehement movements. So much for conclusion No. 3.[1]

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[1] The movements of the cilia *m* are described by Sharpey merely as follows:—"The more opaque cilia, or those of the exterior range, appear and disappear by turns, as if they were continually changing from a horizontal to a vertical direction and back again."—*Loc. cit.*, p. 622. And the author says, he is not aware that any other author has given more exact information concerning them.

On the subject of functions it is also to be remarked, that the pellucid space, fig. 36 *h*, over which these two lines of cilia, *n* and *o*, move so vehemently, belongs to the membrane of the bar (known to be considered as a vessel of the gill), which membrane is probably destined to absorb oxygen from the water, and communicate it to the blood. This would be materially assisted were the stream of water accelerated, and a fresh supply of oxygen constantly afforded.

It must further be remembered, that, as is known, the direction of the current in neighbouring bars is different. If in one it is from the base of the gill towards its margin, in the next it is from the margin towards the base; in the one case appearing to end at a round projection covered with vibrating cilia, fig. 41 *q q*,—in the other appearing to begin there. The direction of the currents now mentioned as opposite in neighbouring bars, is also opposite on the two sides of the same bar, figs. 37, 38.[2] The round projection, fig. 41 *qq*, just referred to, Sharpey has not particularly mentioned. It seems to be of the same nature as his "round projections," *q* in the same figure, with this difference, that where the two bars pass into one another at their ends, two round projections pass into one. Hence the larger size of that at *qq*, fig. 41.

The marvellously complicated movements of the cilia *n* and *o*, figs. 36, 37, 38, 41, the author says he has very often observed, continuing to watch them until they became slower, and at length ceased. At length only groups of them are seen thus moving, then not more than two or three together, and finally single ones. When the movements have entirely ceased, the two lines of cilia lie nearly parallel and somewhat bent, with two lines of the convexity almost always in the same direction as the current their movements had occasioned.

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[1] The cilia *o*, as an independent line, Sharpey appears not to have observed; he mentions and figures merely the cilia *n*, as is evident from the following:—"The motion of the other set consists in a succession of undulations, which proceed in a uniform manner along the sides of the bar, from one end to the other. It might be very easily mistaken for the circulation of globules of a fluid within a canal, more especially as the course of the undulations is different on the two sides of the bar, being directed on one side towards the edge of the gill, and on the other towards the base. But, besides that, the undulations continue for some time in small pieces cut off from the gill, which is inconsistent with the progression of fluid in a canal, the cilia are easily distinguished when the undulatory motion becomes languid. When it has entirely ceased, they remain in contact with each other, so as to present the appearance of a membrane (*d, d*, fig. F)."—Sharpey, *loc. cit.*, p. 623.

So far Dr Sharpey. And the author adds, that he is not aware of any other observer having made any mention of them,—the cilia *o*.

[2] [This fact is also already known.]

It remains to be added respecting the cilia *n* and *o*, that when their movements have terminated, and the cilia are left in a state of relaxion, they often in a short time entirely disappear. Probably most of them break off at their roots, as indeed may constantly happen during life, when the old ones become replaced by new, the former going off when worn out, being carried away by the stream, and thrown out at the excretory orifice.

As nothing until now was known regarding the structure of cilia, everything brought forward as to the cause of their movements has been conjecture only. Having found in them a structure adapted for contraction and relaxation, the author has much pleasure in thus shewing that his fellow-countryman, Professor Sharpey, was right when, in the year 1836, he thought it probable that the moving power of cilia lay in the cilia themselves, and was referrible to a substance contained in more or less of their length, like that of muscle.

The undulatory movements of cilia,—compared by Sharpey, when many were seen together, to those produced by the wind on a field of corn,—the author on two occasions witnessed when performed by cilia in a single line, and when most perfect; on one of which occasions he had the pleasure of shewing the rare spectacle to Purkinje. In both instances this living mechanism was seen at the marginal end of the bar, and in the line of cilia, *m*, fig. 41; in one instance at the point *r*, in the other at the point marked *s*. The rough diagram, fig. 42, will scarcely serve to convey an idea of these undulatory movements, for the appearance was exceedingly delicate and beautiful. The undulating cilia in the two instances were in different conditions. In the one instance they had their spirals in a twine-like state, and were permanently contracted at no part; in the other instance they were permanently contracted at the base. In the first case the movements may have consisted merely of a shortening and lengthening in the axis of the cilia; in the second, of flexion at the base. Further, the cilia in the two instances in question were of different forms; in one instance being straight, in the other curved. As now the contraction of a double spiral implies a twisting of the same, the extremity when bent must describe a course spirally infundibular. [The author observed very young cilia, which evidently shewed in their movements a shortening and lengthening. No definite order, however, such as that implied by undulation, was observed. Perhaps a disturbance had occurred through manipulation.]

It is important, the author thinks, to have seen these undulatory movements performed by the cilia; for, as successors to the cilia, the cilia thus undulating were about to arrange themselves in one of the two lines above mentioned as combining to form a sort of tunnel, through which by their extremely vehement movements to drive a rapid current. And the following occurred to him as possibly sufficient to explain the appearance presented by these movements,—which have been aptly compared to the rapid flow of globules of a fluid. The cilia *n*, fig. 46, are all bent in the same direction; they are arranged in a line, and perform their swinging or lashing movements in an undulatory manner according to the order of their positions in that line. Like movements, and in the same order, are performed by the cilia *o* in the opposite line; their extremities alternating with the extremities of the cilia in the first line, like the fingers of the two hands, and moving without the slightest mutual interference. Now were the movements throughout the whole phalanx of cilia contemporaneous, there would be presented to the eye a permanent line of swinging movements. As, however, those swinging movements are performed by the cilia one after another in the order of their positions in the line, they assume the appearance of a row of roundish waves, following, or as it were chasing, and uninterruptedly passing into one another; not rarely appearing to the eye like a long revolving screw. The difference between rows of globules (the appearance most frequently presented by the movements in question) and screw-cylinders, may be supposed to arise as follows:—When the swinging movements are of different extent at different parts, we have the appearance comparable to a row of globules; when those movements pass uniformly into one another, there is seen the long-revolving screw.[1]

Having found the cilia on the branchial laminæ of Mussels to consist of double spirals, the author deems it scarcely needful to remark, that he infers a like structure in other cilia, exist where they may. As, however, in the course of these researches he has very often had the opportunity of examining cilia of Infusoria, several species of which are met with in the fluid of the Mussel's shell, he cannot refrain from making known the fact, that in these cilia also he finds his double spiral. Often did he see in them the spiral structure with such distinctness, as to feel astonished at its not having been long since observed. As the tails of spermatozoa of course correspond to cilia, their structure must be essentially the same. He states it to be now nine years since he published his observation of the spiral structure of the tail of the mammiferous spermatozoon (Phil. Trans., 1842, p. 107). It is probably owing to a like refractive power in the spirals and in the hyaline which lies between them, that the spirals are so difficult to distinguish in the tails of spermatozoa; and hence it no doubt is that they were not observed before.

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[1] [The screw probably exhibiting the normal, and the row of globules a disturbed state.]

The subject of the present paper being the structure of muscle, the author has avoided the special mention of other tissues. Lest, however, from this omission it should be supposed that he has abandoned his views,—that the structure of all the elementary fibres, as well of plants as of animals, is originally spiral,—he thinks it right before concluding briefly to declare that those views remain unchanged. Bowman says: " Dr Barry might as well have entitled his paper ' On the Spiral Structure of the Organic World.* ' " To this title, satirically proposed by Bowman, the author remarks that he has not the least objection; so far, indeed, is he from being thereby annoyed, that he thanks him for it. He thanks Prof. Bowman for having thus recorded in the Cyclop. of Anat. and Physiol. as far back as in the year 1842, that his (Dr Barry's) views in regard to the spiral structure of organic fibre were universal in their character; "and I am convinced," it is added, " that the day will come when my views will be as universally adopted by physiologists, as I myself am convinced that the spiral structure is universal. Let it only be fully understood what those views are. What I maintain is, that the spiral form of fibre everywhere is the original and incipient form; and that if this form be lost in many tissues in the course of their special development, it remains permanent in the fibre of muscle as a necessary attribute of its function."

In a postscript it is added, that in the contractile stem of the Bell polype (*Vorticella convallaria*), of which several specimens were examined, the author found his double spiral. In relaxation, this double spiral lay in its extended cylindrical gelatinous sheath, (which he regards as its elastic sarcolemma) in [elongated] spiral winds. In contraction, it presented itself in manner about the same as that in fig. 18; with this difference, that the double spiral in the polype was enclosed in its gelatinous sarcolemma, which that figure, representing quite another object, does not shew.

[This paper is accompanied by a number of figures, for which the reader is referred to the Philosophical Magazine.]

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* Cyclop of Anat. and Phys., art. " Muscle and Muscular Motion," p. 511.

ART. IV.—*Additional Remarks on the rate of Mortality in the Medical Department of the British Navy.* By THOMAS STRATTON, M.D., Edinburgh; Surgeon, Royal Navy.

In the Edinburgh Medical and Surgical Journal for January 1844 (volume sixty-first), I gave an account of the yearly rate of mortality in the Naval Medical Department for twenty-five years from 1817 to 1841, and I beg now to continue the same subject for other ten years, up to the end of 1851.

In the following table the second column shews the number of medical officers in the navy-list, on the first of January; another way might be to add together the number in each of the four quarterly lists, and divide by four to find the average, as one quarter sometimes differs a little from the others. The third column shews the number of deaths in the year; these are taken from the lists for April, July, October, of that year, and the list for January following. The fourth column gives the proportion of deaths to officers; the fifth shews the per-centage, and for ready comparison with other tables, the sixth column exhibits the per-milleage of mortality.

Year.	Number of Medical Officers R.N.	Number of Deaths in the year.	One Death in Officers.	Deaths in 100 Officers.	Deaths in 1000 Officers.
1842	1085	31	35·0	2·8	28·5
1843	1015	42	24·1	4·1	41·3
1844	1071	33	32·4	3·0	30·8
1845	996	37	26·9	3·7	37·1
1846	965	36	26·7	3·7	37·3
1847	960	40	24·0	4·1	41·6
1848	980	45	21·7	4·5	45·9
1849	990	42	23·5	4·2	42·4
1850	961	37	25·9	3·8	38·5
1851	915	34	26·8	3·7	37·1
Ten years	9938	377	26·3	3·7	37·9
Annual Average for ten years	993·8	37·7	26·3	3·7	37·9

The lowest annual mortality is one in thirty-five, and the highest is one in twenty-one.

In the previous twenty-five years, up to 1841, the lowest mortality was one in forty-one, and the highest one in twenty-three; there being one death in thirty-seven officers, and thirty-four deaths per thousand.

AVERAGE ANNUAL MORTALITY

In England and Wales. Males of all ages.	Among Naval Medical Officers. Age above 21.
1 in 46. (*Farr.*)	1 in 37.
22 per 1000. (*Edmonds.*)	37 per 1000.

It thus appears that the naval medical mortality is about one-half greater than the mortality in the general population, and if compared with accounts of the latter confined to males above the age of 21, it would probably be double, as there is a greater proportionate mortality in children than among adults.

When we thus find that the risk of life is so great in the naval medical department, any one would naturally expect that there would be advantages pecuniary and otherwise, to compensate for the same; it would be particularly gratifying if one were able to say that such was the case.

Thinking that some readers, particularly in the colonies, (where facilities of reference to books are less than in Britain) might find it convenient to refer to, I beg to append to the above brief notice, the following table.

Age.	Number who		Total Deaths.	Expectation of Life of Remainder.	Age.	Number who		Total Deaths.	Expectation of Life of Remainder.
	Complete that Age.	Die in the next interval.				Complete that age.	Die in the next Interval.		
0	10,000	774	0		52	4,276	65	5,724	19·68
¼	9,226	256	774		53	4,211	68	5,789	18·99
½	8,970	255	1,030		54	4,143	70	5,857	18·31
¾	8,715	254	1,385		55	4,073	73	5,927	17·63
1	8,461	682	1,539		56	4,000	76	6,000	16·98
2	7,779	505	2,221		57	3,924	82	6,076	16·34
3	7,274	276	2,726		58	3,842	93	6,158	15·71
4	6,998	201	3,002		59	3,749	106	6,251	15·10
5	6,797	121	3,203		60	3,643	122	6,337	14·50
6	6,676	82	3,324		61	3,521	126	6,479	13·92
7	6,594	58	3,406		62	3,395	127	6,605	13·34
8	6,536	43	3,464		63	3,268	125	6,732	12·79
9	6,493	33	3,507		64	3,143	125	6,851	12·24
10	6,460	29	3,546	48·85	65	3,018	124	6,982	11·70
11	6,431	31	3,569	48·09	66	2.894	123	7,106	11·18
12	6,400	32	3,600	47·35	67	2,771	123	7,229	10·67
13	6,368	33	3,632	46·61	68	2,648	123	7,352	10·17
14	6,335	35	3,665	45·87	69	2,525	124	7,475	9·68
15	6,300	39	3,700	45·14	70	2,401	124	7,599	9·21
16	6,261	42	3,739	44·40	71	2,277	134	7,723	8·76
17	6,219	43	3,781	43·67	72	2,143	146	7,857	8·32
18	6,176	43	3,824	42·94	73	1,997	156	8,003	7·90
19	6,133	43	3,867	42·22	74	1,841	166	8,159	7·49
20	6,090	43	3,910	41·50	75	1,675	160	8,325	7·11
21	6,047	42	3,953	40·77	76	1,515	156	8,485	6·74
22	6,005	42	3,995	40·05	77	1,359	146	8,641	6·38
23	5,963	42	4,037	39·33	78	1,213	132	8,787	6·03
24	5,921	42	4,079	38·61	79	1,081	128	8,919	5·70
25	5,879	43	4,121	37·90	80	953	116	9,047	5·39
26	5,836	43	4,164	37·18	81	837	112	9,163	5·08
27	5,793	45	4,207	36·47	82	725	102	9,275	4·78
28	5,748	50	4,252	35·77	83	623	94	9,377	4·48
29	5,698	56	4,302	35·07	84	529	84	9,471	4·19
30	5,642	57	4,458	34·38	85	445	78	9,555	3·92
31	5,585	57	4,415	33·70	86	367	71	9,633	3·65
32	5,528	56	4,472	33·03	87	296	64	9,704	3·38
33	5,472	55	4,528	32·36	88	232	51	9,768	3·12
34	5,417	55	4,583	31·70	89	181	39	9,819	2·88
35	5,362	55	4,637	31·04	90	142	37	9,858	2·65
36	5,307	56	4,693	30·39	91	105	38	9,895	2·41
37	5,251	57	4,749	29·75	92	75	21	9,925	2·17
38	5,194	58	4,806	29·10	93	54	14	9,946	1·95
39	5,136	61	4,864	28·46	94	40	10	9,960	1·74
40	5,075	66	4,925	27·81	95	30	7	9,970	1·55
41	5,009	69	4,991	27·16	96	23	5	9,977	1.41
42	4,940	71	5,060	26·49	97	18	4	9,982	1·17
43	4,869	71	5,131	25·82	98	14	3	9,986	0·83
44	4,798	71	5,201	25·15	99	11	2	9,989	0·50
45	4,727	70	5,273	24·48	100	9	2	9,991	0·00
46	4,657	69	5,343	23·80	101	7	2	9,993	
47	4,588	67	5,412	24·12	102	5	2	9,995	
48	4,521	63	5,479	22·44	103	3	2	9,997	
49	4,458	61	5,542	21·74	104	1	1	9,999	
50	4,397	59	5,603	21·07	105	0	1	10,000	
51	4,338	62	5,662	20·37					

The first three columns of the above table are Milne's calculations from the Register at Carlisle (Professor Hamilton's *Introduction to Merchandise*, edited by Johnston, Edinburgh, 1820); the fourth column I have added, and the fifth, or expectation column, is from the pamphlet of the London National Loan Fund Life Assurance Society.

The table commences with 10,000 children born alive; according to one record of observations (Mayence Maternity Hospital, for 42 years), in sixteen births there is one child still-born.

PRINCE-EDWARD ISLAND,
March 1852.

ART. V.—*Defence of the Doctrine of Vital Affinity.* By WILLIAM PULTENEY ALISON, M.D., &c. &c., Professor of the Practice of Medicine in the University of Edinburgh. (Transactions of the Royal Society of Edinburgh, vol. xx., Part iii. Read 15th March 1852.)

Having expressed a decided opinion that there are, in all living bodies, chemical as well as mechanical phenomena, which, in the present state of our knowledge, ought to be designated as Vital, and referred to the operation of laws, distinct from those that regulate the chemical changes of inanimate matter, and observing that this opinion is controverted, and that the view of the chemical phenomena of life which I have maintained, is rejected as unphilosophical and delusive by two authors of high scientific reputation—Baron Humboldt and Dr Daubeny—and that the judgment of other authors of acknowledged character on this subject is not clearly expressed, and seems to me to involve it in unnecessary obscurity, I am led to hope that some farther explanations may be of some use in establishing the first principles of a science which, as it appears to me, has suffered, in several instances, not so much from want of facts, as from hypothetical and erroneous inferences, drawn from facts that are already known.

When I first undertook, above thirty years ago, to deliver lectures on Physiology, I ventured to express an opinion, that " a discovery would be made, connecting the *ingesta* into the animal body with the nourishment of the different textures, and with the nature of the different *excretions*, equally important as illustrating the obscure *chemical phenomena* of the living body, and the intention of the different secretions, as the discovery of the circulation of the blood was, in illustrating the *movements* going on in its interior, and the use of the organs concerned in effecting them." It did not occur to me, nor do I know that any one had then conjectured, that these chemical phenomena, like the movements of the animal fluids, partook of the nature, and formed part of *a circulation*, but of one of such extent and complexity, that the atmosphere, the soil, and the vegetable kingdom, furnish the other great links in the circuit, and that all the elements of the ancients, fire, air, earth, and water, are literally and essentially concerned as agents in maintaining it.

It appears, however, from the following passage in one of the earlier writings of Sir Humphrey Davy, that he was aware of, and had duly reflected on, the most material facts on which this important discovery is founded:—"Nature has catenated together organic beings, and made them mutually dependent on each other for their existence, and all dependent on light. A privation of light would be immediately destructive to organic existence; vegetation would cease; the supply of oxygen gas would be quickly cut off from animals; the lower strata of the atmosphere would become composed of carbonic acid; and perception and volition would exist no longer."[1]

The following description of the circulation, in which all the matter destined by nature to the maintenance of organised creation on the earth's surface is continually engaged, is merely an amplification of the expressions of Dumas; and although part of the statements contained in it are liable to objection, its general import is such as amply to fulfil the expectation of a great discovery which I had expressed.

Vegetables under the influence of light, and of a certain temperature, are continually abstracting from the atmosphere, directly or indirectly, a part of its constituents in the form of water, carbonic acid, a little nitric acid, and ammonia. The radicals of this inorganic matter (*matiere brute*) are gradually organised in vegetables, which are a true reducing apparatus, while a part of its oxygen is set free; and, after being formed into organic principles, those radicals are yielded directly or indirectly to animals. This matter is applied, without farther change, to the maintenance of the functions of animal life; particularly it furnishes the conditions, and becomes the instrument, of mental acts; after which, as if exhausted by the effort which it has made, it falls again under the influence of oxygen, in the animal body, which is a true apparatus of combustion; and either before or after the death of the animal structure, returns as inorganic matter, under the name of manure, to the great reservoir from which it came. In this eternal circuit, life is the chief agent, and by these changes it makes itself known; but the matter that is thus employed undergoes only a change of place. I apprehend we must add, that the *properties* as well as the *position* of this matter are continually *altered* and *resumed*, and that it is the modification which the properties of this matter undergo, in the course of this circulation, which constitutes the precise object of all physical inquiries, both in vegetable and animal physiology, so far as the organic functions of animals are concerned.

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[1] Works, vol. i., p. 106.

The final cause of all these changes is already obvious. We know that it has pleased the Author of our being to connect with a world previously existing, and consisting of matter already long endowed with all its physical properties, an infinite number and variety, and eternal succession, of sensitive creatures, and ultimately a race of beings "formed after his own image." The acts of sensation and thought which characterise these, he has placed in immediate connection with that peculiar structure, endowed with still more peculiar properties, to which we give the name of a living Nervous System; and he has established laws, in the execution of which the vegetable as well as the animal kingdom bears its part, according to which infinite varieties and endless successions of nervous systems shall be engendered and supported from a limited quantity of the matter originally contained in the atmosphere surrounding our globe,—shall be nourished, lodged, protected, and enabled to satisfy the wants and to obey the will of their immaterial inhabitants; but all this innovation on the laws regulating the matter previously existing on the earth's surface is only transient. The same portions of matter which are thus employed, whether they pass through vegetable structures only, or minister to the support both of vegetables and animals, are restored unchanged to the reservoir whence they came,—in the latter case more rapidly and frequently, and during the life of the structures thus maintained,—and are ready to run the same course again when again placed in presence of living beings. Like the figures of snow, into which the imagination of Southey figured the magician Okba, breathing the breath of life every morning, that they might people the surrounding wilderness, and charm the solitude of his daughter Leila, they all receive vitality only for their day, and

> "Ever when night closes,
> They melt away again;"

and such of them as have served as the habitations of mental acts or feelings then "restore the spirit to Him who gave it." The provisions for the temporary maintenance, for the protection and comfort, for the sentient and mental enjoyments, and the eternal reproduction, of this infinite number and variety of sensitive beings, out of a limited quantity of certain chemical elements contained in the earth's atmosphere,—and for the progressive development of the human mind, as the destined lord of this creation,—are the great laws of life, the investigation of which is the object of this science. The power of perceiving their adaptation to their object, and of appreciating the grandeur of the design, is one of the highest privileges of our nature; and without pretending to be qualified to assign the respective merit of the different physiologists, geologists, and chemists, who have illustrated the different parts of this general view of life,—of Cuvier, Dalton, Prout, Liebig, Brongniart, Prevost, Dumas, and Bousingault, and their numerous friends and followers,—we may all congratulate ourselves on having lived in the age when so much of the designs of Infinite Wisdom for the regulation of this world has been made manifest to mankind.

But when we inquire a little more minutely into the nature of the changes constituting this great vital circulation, I think it must appear obvious, that the most essential of all are and must be strictly *chemical;* and it seems to me that the grandeur of the design is not clearly perceived, unless we fix attention on the alteration *of all* the qualities of matter which are here implied, and shew that the power which has introduced living beings upon earth has had at its command, and has actually modified, *all the laws of nature.* The water, carbonic acid, and ammonia, which form the chief and essential constituents of the ingesta of vegetables, are there thrown into combinations, differing from any which they form, or which can be formed from the elements composing them, in any other circumstances. This is fairly admitted by Dr Daubeny, who says,—"We are still far from imitating nature in those processes by which she continues to bring about the wonderful products of organic life, and must admit that, judging from what is yet known, there would seem to be *a power residing in living matter, distinct,* at least in its effects, *from ordinary chemical and physical forces.*"[1]

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[1] On the Atomic Theory, p. 370.

Now, before going farther, let us observe how essential to everything living, and how peculiar in its effects (from which alone it is known to us), is this power residing in living matter, and distinct from ordinary chemical forces, but which Dr Daubeny must regard as producing chemical effects, because he himself ascribes to it the formation of "the wonderful products of organic life."

Let us remember, that the very first requisite to the commencement of this great vital circulation, the decomposition of the carbonic acid of the atmosphere, fixing the carbon which is to serve as the basis of all organised structures, and setting free the oxygen, producing therefore a change which is unquestionably both peculiar and chemical, "is done by a power," as stated by Liebig, "surpassing that of the strongest galvanic battery, to which the strongest chemical action cannot be compared." Next, let us observe, that the compounds formed in living bodies under the influence of this acknowledged power, of which the first indications are so striking, possess peculiarities (which I formerly noticed) quite sufficient to distinguish them from all compounds formed by chemical affinities, under any other circumstances in nature. They have a uniform complexity of constitution, even in the minutest particles, not seen in inorganic solids; they assume perfectly definite forms, varying, not according to their chemical constitution, but according to their living progenitors, or the particles of living matter with which they come in contact. These forms, as long as they belong to living structures, never become crystalline; although the same elements, after escaping from the immediate contact and influence of living structures, even within the excretory ducts by which they are to be thrown out of the body, fall into compounds which take the crystalline arrangement. Above all, these organic compounds, thus influenced by *place*, are equally liable to an influence of *time*. They are all of transient duration, and particularly in the case of animals, we know that at the same time, at the same points, and in presence of the same agents, in which the matter originally introduced from vegetables is applied to the nutritive assimilation and formation of the living textures, other portions of the same elements, previously used in the same process, are continually yielding to the influence, previously resisted, of the oxygen of the air, and are forming another set of compounds, by the process of destructive assimilation, which are ready to take the form of crystals, which either already possess, or rapidly tend to, the composition of the inorganic matter whence all these compounds originate;—which are poisonous if retained in the body, and for which, therefore, outlets are provided in the organs of excretion, so as to justify the striking expression of Cuvier, that all living animal matter, although the depository of force which will compel other matter to follow the same course as itself, will soon occupy its own place no longer. This is a series of chemical changes quite distinct from anything seen in any other circumstances of nature. And farther, we know, in regard to the power exciting these, that it is obedient to certain laws of animal life, to which nothing analogous is seen in other chemical operations; nutrition and secretion being liable to sudden and important change, as living movements are, by living changes in nervous matter, *e. g.*, by those which attend certain acts of mind; and farther, every such action being liable to diminution or exhaustion by the degree in which it is itself exercised.

It will be observed, that all these are peculiarities in the *chemical* nature and constitution even of the minutest particles of all living structures, and that without reference to them, nothing living can be characterised. These phenomena are just as distinctly peculiar to living bodies, and characteristic of their living state, as the contraction of muscles, whether produced by irritations of their own fibres, or of the nerves entering them, and they are much more general in all classes of living beings. If anything in the economy of living beings demands explanation, or is deserving of being made the object of scientific research, it must be these, their most essential characteristics. If they are not of such importance as to demand special investigation,—if it is only the movements of the particles concerned either in the development of vegetables, or the varied functions of animals, that we ought to regard as peculiar to living bodies,—then physiology, so far as these properties of living bodies are concerned, has no claim to the title of a separate science, it is only a branch of chemistry. But it is just as probable, *a priori*, that the laws of chemistry should undergo a modification in living bodies, as that the laws of motion should be made subordinate in certain parts of living animals, to the vital property of irritability of muscles, as explained by Haller; and the very peculiar changes which are observed in tracing the course of the elements of water, carbonic acid, and ammonia, which are absorbed by vegetables, until they pass out in the form of water, carbonic acid, and ammonia (or in compounds immediately resolvable into them), in the excretions of animals, and resume their office as manures, afford a manifest presumption that such modification takes place.

The chief consideration which seems to have prevented Dr Daubeny from acknowledging that the power which he himself supposes to exist in living beings, and to regulate chemical changes there, is deserving of a separate name and a separate inquiry, is thus stated:—"If it is asserted that this power is to be directly ascribed to the vital principle itself, we pause for further information."

Here it seems to me manifest, that there is a misapprehension as to the correct meaning of words, and one which may be traced in many other speculations in the elementary departments of physiology,—investing the term Vital Principle with a meaning much more mysterious and formidable than is needful. According to the only idea which I can form of what is properly termed the vital principle, Dr Daubeny has already admitted, in the words above quoted from him, that, so far as we can yet see, we *must* regard the vital principle as concerned in forming the "wonderful products of organic life;" because, he says, that these result from a power residing in living matter, producing physical effects, yet distinct in its effects from ordinary chemical and physical forces.

The only correct way of defining what we call Vitality, or the vital principle, as I have always maintained, and as I think, the best authorities now admit, is this,—*First*, we describe what we call living beings. They are those, as Cuvier states, which originate by a process of generation, which we can describe,—are maintained by a process of growth and nutrition, which we can describe,—and terminate by death and decomposition, which we can describe. Then, having thus discriminated those bodies which we call living, we say that, in so far as we can satisfy ourselves, that any part of the phenomena which they present are inexplicable by, and inconsistent with, the laws regulating the changes of any other matter, we call them effects of the vital principle, or vitality, and that is our definition of those terms. Those who object to the use of the substantive noun Vitality, or the Vital Principle, as a general expression for such phenomena, constantly use the adjective Vital, or Living, which conveys the very same meaning, and can be defined, as I apprehend, in no other way. The real *efficient* cause of these, as of all other phenomena in nature, is the Divine will, and is inscrutable; but we know, that, in all departments of Nature, this all-powerful cause acts according to laws which we can understand, and the discovery and application of which is the object of all science. When we see that any phenomena in nature take place according to the same law as others more familiar, we are said to explain them, or to assign their physical cause; but, until that is clearly ascertained, we obey the dictates of science in declining to arrange them along with those depending on any law otherwise known to us, and endeavouring to apply the method of induction to themselves, and to any such isolated phenomena as may seem analogous to them, so as to ascertain laws peculiar to this set of phenomena.

Dr Daubeny refers also to a passage in the writings of Dr Bostock, in which he speaks of reference to the operation of the vital principle, or to any vital affinities, "as one of those delusive attempts to substitute words for ideas, which have so much tended to retard physiological science;" or, as it may be more simply expressed, as only a reference to an occult cause, or a confession of ignorance on the subject. On this I would observe, that if, by merely using the term vital affinity, we were to suppose that we offered a *sufficient explanation* of any phenomena, I would agree with Dr Bostock. But I use the term only as defining the department of human knowledge to which these phenomena are to be referred, and in which the explanation of them (*i. e.*, the law according to which they take place), is to be found; and thus using it, I maintain that there is nothing delusive or unscientific in thus limiting and fixing the object of our inquiries. The investigation of the law or laws by which vital affinities are distinguished from the affinities of inorganic matter, is a subsequent inquiry, in which we may add, that some progress has been made. It is something, for example, to say that vital affinities shew themselves in living beings in two distinct ways; *first*, by the formation of new compounds, found nowhere else in nature; *secondly*, by the selection and attraction of these compounds, at different points, out of a very complex fluid, so as to form organised structures; and to point out the circumstances in which these powers act. It is something to say, with Dr Prout (if that principle is to be held as established), that in the formation of new compounds in living bodies, the elements employed by nature are not subjected to any new affinities, but only hindered from obeying certain of those which actuate them in other circumstances; while others are allowed to act. It is something to say that the compounds thus formed perish many times during the life of the structure in which they are contained,—the more rapidly as their vital properties have been more energetically exercised; and by perishing furnish the poisonous matter which continually circulates in every living animal, and for the expulsion of which the organs of excretion are provided. It is something to say that carbon, fixed from the atmosphere by plants, is the substratum of all the organic compounds of which living beings are composed; and that oxygen, taken in by the lungs or gills of animals, is the great agent in forming the excretions by which they are constantly worn down. And I think we define and limit all these inquiries satisfactorily, when we say, that we seek to ascertain the laws, according to which ordinary chemical affinities are modified in living bodies; or according to which that power acts, which, by Dr Daubeny's own admission, resides in living bodies, and produces chemical effects, " but is distinct from ordinary chemical forces."

Dr Daubeny goes on to say, that nature has at her command an apparatus of a more refined and subtle description than any which we can command, and may therefore accomplish effects by purely chemical and physical agency, which may for ever lie beyond the reach of the coarser manipulations of art; and here he refers to Humboldt, who says, that as we do not understand all the conditions under which ordinary chemical and physical forces act in living beings, we are not entitled to *assert* that they *may not* produce all the chemical changes that we see in them: to what conditions he here alludes does not appear, but he gives this as a reason for renouncing, or, at least, expressing doubts as to the theory of vital affinity which he had formerly espoused, and illustrated by an allegory under the name of the Rhodian Genius.

Dr Daubeny says more precisely, that " the peculiar *structure of parts*, arising out of the *movements* induced by a vital principle, *may be found* competent to bring about these phenomena in question, and that it is incumbent on us to investigate to the full the extent to which such physical causes can be supposed to operate, before pronouncing whether there may not, after all, be some *residual phenomenon*, inexplicable by the common principles of science, and which we must therefore refer to vital affinity." But even in regard to movements, from his expressions at p. 379,[1] he does not seem to admit that any others are to be ascribed to the vital principle, than those which result from contractility.

In thus admitting that the *movements* which take place in living animals, at least those which can be referred to contraction of solids, arise out of the vital principle (which, I apprehend, means only that they are an ultimate fact,—so far as yet known exemplified in no other department of nature); and in ascribing to the peculiarity of those movements the peculiar structure of living parts, and through the intervention of that structure the peculiar chemical changes of living beings, Dr Daubeny has stated what I believe to be the general idea of those physiologists who reject the doctrine of vital affinity. They think that having allowed that *movements*, and particularly contractions of living solids, are truly vital phenomena, they have furnished a *possible* explanation of all chemical changes which seem peculiar to life, and that they are entitled to throw on us the burden of *disproving this theory*, before they can be called on to admit any such principle as vital affinity modifying chemical laws in the living body.

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[1] On the Atomic Theory.

To this I reply, *first*, that this theory in explanation of the chemical phenomena of life is distinctly *inadequate*. I do not think it can be more distinctly stated, or more plausibly supported, than it was by the late Dr Murray, in treating of *Secretion*, who, at the same time, however, distinctly admitted that it was " *hypothesis* supported by little direct proof. The cause of production of the new combinations which constitute secretion," he says, " *may be* the simple approximation of the elements which constitute the blood. That fluid is propelled by the *vis a tergo* into canals of the most astonishing minuteness, the diameters of which are still farther diminished from their alternate contraction from the stimulus of the blood. There can be no doubt that in compounds the force of attraction subsisting among their constituent particles, is modified by the distance at which these are placed; and in compounds especially, which consist of four or more principles, the slightest alteration in their relative situation is sufficient to change entirely their existing attraction, and induce new combinations. The blood is a compound of this kind; its ultimate principles, too, are capable of entering into an innumerable variety of combinations with each other; we may conceive, therefore, that when subjected to the contraction of the extremely minute vessels through which it is forced to circulate, the relative position of its elements will be changed, and new combinations formed. And if we suppose a fluid thus passing through tubes of different diameters, and undergoing successive decompositions, we may easily conceive that very different products may be formed from the same original compound. This affords a very simple view of the nature of Secretion. No complicated apparatus is requisite; all that is necessary, being the propulsion of the blood through extremely minute vessels capable of contraction. And it is easy to account for the variations to which secretion is liable, as the contraction of the vessels must vary from variations in the state of their irritability and of the stimuli acting on them."—(*Murray's System of Chemistry*, vol. iv., p. 518.)

In regard to the Nutrition of solids, Dr Murray says merely that they appear to *attract immediately from the blood* the materials which it contains ready formed, as there is probably "no solid in the animal body, of which the immediate principles do not exist in the blood."—(*Ibid.*, p. 516.)

But I need hardly say that subsequent researches have not only completely demonstrated the insufficiency of this explanation, but have shewn that the cause of the difference of products formed apparently from the same blood, must be essentially different from that here assigned; and I would say farther, have shewn that the peculiarity of the compounds formed in living bodies cannot be reasonably ascribed to any modification of those *movements* of fluids, which Dr Daubeny regards as the only results of the vital principle. To shew this, I need not go into the question of the mode of action of arteries on the blood, or the portion of the changes essential to secretion, which takes place in *cells*, exterior to vessels, and, of course, cannot be ascribed merely to the pressure to which the blood passing along the vessels may have been subjected; which had certainly been misapprehended by Murray, as by most other physiologists of that day. It is sufficient to quote a brief statement from Cuvier, which seems to me quite conclusive as to the question, whether difference of secreted fluids in the animal economy can be ascribed to difference in the structure of, and therefore of the movement of the blood through, the organs in which they appear. "The same organ," he says, *i.e.*, the organ secreting the same fluid from the blood, "presents in different classes of animals, sometimes in the same class, perfectly distinct structures. This is true of the true salivary glands, of the testes, even of the liver, of which the organisation is the most uniform, and likewise of the kidneys." "It would be interesting also," he adds, "to compare the secreting organs with their secreted fluids, and observe whether the organs that have a similar structure afford similar products. But experience will sanction no such theory. Nothing, for example, can be more various than the matter furnished by 'crypts' in different animals, from a simple mucus to the most odoriferous compounds." "The simplest secreting organs," he observes elsewhere, "are in insects, where they are merely tubes which float in the general nourishing fluid, which is in contact with their outer surface, while their inner surface contains the secreted fluid. Secretion there can be only a kind of *filtration;* but how different from that which can take place where there is no life, through 'an inorganic solid!'" —(*Leçons sur l'Anat. Comp.*, Lect. xxx., Art. 1.)

But farther, not only is the complex vascular structure and the varying pressure from contracting solids, which was regarded by Murray as the main cause of the formation of new compounds out of the blood, shewn by the examination of other animals, to be quite unnecessary for that purpose; but we now know, that where these conditions exist, that formation is *never* effected—the most compound fluids of the animal economy, which *appear* in the different glands, being really not formed there, but in the course of circulation, and appearing in the blood or in other parts of the body, when the organs where they usually appear, have been extirpated, or rendered useless by disease; that is, when the cause to which their origin is here ascribed has been absolutely withdrawn.

The mere selection and attraction out of the blood at different places, of different compounds already existing and circulating in it, is certainly the chief, and, according to many, and particularly according to Dr Daubeny himself, the sole office, performed by any parts *of animals* by which any new organic products are exhibited; and the office of forming those organic compounds, the origin of which is the great chemical change effected by living beings, is performed by no organ capable of exerting a varying power of contraction and pressure, but simply by *the cells of vegetables*, where the fluid introduced from without is usually not conveyed in vessels at all, and is clearly not subjected to any such pressure from contracting solids, as is exerted on the blood in most animals; nor to any such peculiar cause of movement as can be ascribed to the living property of contractility, the only one which Dr Daubeny admits to be strictly vital.

I have formerly stated, and notwithstanding the opposition of Dr Daubeny and others, still think, that the judgment of various authors on the respective offices of vegetables and animals as to vital affinities,—the supposition that *no* organic compound can be formed in animals, and that their office is *merely* the selection and appropriation of the compounds formed in vegetables, and afterwards the destructive assimilation by which these are restored, through the excretions, to the inorganic world, is too hasty. It appears from the experiments of Liebig himself, that the infusory animals decompose the carbonic acid of the air, and exhale oxygen in like manner as vegetables; and the evidence of the formation of oily out of saccharine or amylaceous matters in many animals, appears to be unequivocal. The two distinct powers, therefore, of *forming* and of *fixing*, or appropriating the organic compounds, are not so accurately divided between the vegetable and animal world as has been thought. But the more that any physiologist is convinced, as Dr Daubeny is, that the formation of organic compounds is peculiar to vegetables, certainly *the less reason* can he have for supposing that this great change can be due to any mechanical movements, on the principle of contraction and impulse, arising out of the vital principle; the provisions for such movements being so striking a part of the economy of animals, and never having been proved to exist at all in vegetables.

But, *secondly*, In maintaining the scientific correctness of the doctrine of vital affinity, as I have defined it, I think it quite unnecessary to go into these details. I maintain that the objections made to this doctrine, both by Daubeny and Humboldt, are *logically incorrect*, because, in dealing with a set of facts so extraordinary, so important and characteristic as the chemical changes of living beings have been shewn to be, they hold it to be incumbent on us to prove the *negative* proposition, that these *may not* ultimately be referred to those laws which regulate the chemical changes in dead matter, which may be acting under conditions not yet known, and of which they say nothing. The rule of sound logic is,—"*affirmantibus incumbit probatio.*" It is admitted on all hands, that the phenomena of life in general are so peculiar and important as to be properly ranked together as a separate science; and we have shewn, that of these phenomena, the most essential and characteristic are certain chemical changes, which are admitted to be so distinct from any that can be observed anywhere else in nature as to "indicate the existence of a power distinct from any simply chemical or physical forces." It is clearly incumbent on those who maintain that, nevertheless, these ordinary chemical forces, acting under conditions not yet understood, may be found adequate to this explanation, to give evidence in the way of observation and experiment of this proposition, otherwise their doctrine is only a hypothesis. If the subject is not thought worthy of scientific inquiry at all, then Physiology is not a separate science. If it is regarded as a separate science, of equal interest and importance as any other, then it is the duty of physiologists, acting on the strict method of induction,—because ascending from facts to principles, instead of descending from principles to facts,—to examine these individual phenomena themselves, arrange and classify them as they present themselves in the different classes of living beings, and consider how far laws deduced from the observation of dead matter can go in the explanation of them; but wherever we find that there is a difficulty in that explanation,—instead of straining the principles of other sciences formerly ascertained, to make them include phenomena admitted to be distinct from any of those to which they have formerly been applied,—it becomes our duty to attempt the investigation and determination of laws peculiar to *this* department of nature. If these laws shall ultimately resolve themselves into any previously known and more general laws of nature, science will be simplified, and a great advance made; but it is assuredly mistaking the right order of inquiry to assert that, *because such simplification may ultimately be effected*, therefore we are now to decline giving these phenomena an appropriate name, and endeavouring to reduce them to general laws by an induction limited to this department of nature itself.

This is the principle which has been successfully followed in other departments of science. Speculations have been hazarded as to the cause of the principle of Gravitation itself. I recollect that the late Mr Playfair used to say a few words in favour of one of these, the theory of Ultra Mundane Particles continually moving in all directions through all space, although not making themselves known to the human senses; which, if admitted, would resolve the principle of gravitation into that of motion communicated by impulse. But no one will maintain, that it was incumbent on Newton to prove, that this theory would *not* explain the phenomena, before asserting the principle of gravitation, and determining, by observation and experiment, the laws according to which that principle acts, or by which the phenomena coming under that head are regulated. It is, indeed, observed in many departments of science, that one great difficulty in the early inquiries is, to keep the inquirers from deviating into lines of research which they may think analogous to their own, and applying prematurely principles which have been established by an induction of very different facts. This is the error which Dr Reid made an object of special remark when speaking of the "enumeration of the original powers and laws of our mental constitution." "Success in an inquiry of this kind it is not in human nature to command; but perhaps it is possible, by caution and humility, to avoid error or delusion. The labyrinth may be too intricate to be traced through all its windings; but if we stop when we can trace it no farther, and secure the ground we have gained, there is no harm done; a quicker eye may in time trace it further."—(*Hamilton's edition of Reid*, p. 40.)

In physiology, it is a similarly just and comprehensive observation of Mr Lawrence, "that although organised bodies are subjected in many respects to physical laws, yet, as regards their own peculiar phenomena, the reference to gravity, to attraction, to chemical affinity, to electricity or galvanism, can only serve to perpetuate false notions in physiology, and to draw us away from the proper point of view in which the nature of living phenomena, and the properties of living beings, ought to be considered."—(*Two Introductory Lectures*, p. 161.) It was the same idea, not, perhaps, so accurately conceived, but more graphically announced, which prompted Dr William Hunter's remark, in commencing the subject of Digestion in his Anatomical Lectures. "Some tell you that we have here a fermenting vat, and some tell you we have a stewpan, but I tell you *we have a stomach.*" And when we remember how little has been done to elucidate the function of digestion by likening the changes in the stomach either to fermentation or to chemical solution (although both are principles which appear to act to a certain extent), and how much comparative anatomists and physiologists have done, by extending their inquiries into other classes of animals, and studying in all, the changes which commence in the stomach and terminate in the different organs of excretion,—to establish laws peculiar to physiology, under which so many forms of structure, and so many vital operations may be arranged,—we can hardly fail to admit that this distinction was wisely drawn. Indeed, the whole science of Morphology, or of the *analogies of the structures* formed by living action,—as it is certainly a branch of knowledge strictly *sui generis*,—may be said to furnish an illustration of the advantage of keeping the investigation of the laws of living action entirely separate from all other scientific inquiries.

But the authority to which I would wish particularly to refer, as sanctioning and authorising the view of the chemical phenomena of the living body which I here advocate, is that of Haller, whose great achievement in physiology was simply that of establishing the strictly vital nature, and laying down the most important laws, of the living property of Contractility; the only property concerned in organic life which is expressly admitted by Dr Daubeny to be truly vital, but to the assertion of which the mechanical physiologists of that age were opposed, on grounds, as it appears to me, exactly analogous to those on which the doctrine of vital affinity is now opposed, because *it had not been proved* how far the mechanical properties of matter were, or were not, adequate to explain the movements of living bodies.

"As all physiology," says Haller, "involves a history of motions by which the animal machine is agitated, and as all motions have their own laws, we can perceive why, about the end of last century, the principles of hydraulics, hydrostatics, and mechanics, were transferred to physiology. There is a difficulty in this matter, however, and if we reckon up all the good, and all the evil, which has been done to physiology, by the cultivation of these sciences, some may think that we might gladly renounce all the good, for the sake of escaping the evil. There are certainly many things in the animal economy very different from the effects of ordinary mechanical laws; great movements excited by slight causes; the flow of fluids hardly diminished by causes which, according to established mechanical laws, ought to arrest them entirely; motions excited by unperceived causes; vigorous movements produced by the contraction of weak fibres, &c.; from which I do not infer, that simply physical laws are to be repudiated in physiology; but this I maintain, that they are *never to be transferred to the explanation of phenomena of living bodies, unless their application is confirmed by experiment*."—(*Phys. Prin.*, p. 6.)

It might have been perfectly fairly argued at that time, that physiologists did not understand all the conditions under which the laws of mechanics and of hydraulics (admitted to have a certain influence) act in a living body, and that until it was ascertained that these *would not suffice* for the explanation,—that there was some *residual phenomenon* of life not capable of being so explained,—the exposition of any laws of motion peculiar to living bodies was premature. But Haller did not think it incumbent on him to prove this *negative* proposition, before announcing the laws of muscular irritability, as distinguished from any merely physical cause of motion; and I believe we shall all now admit, that if he had thought this incumbent on him, the greatest impulse which the science of physiology received during the last century, would have been long, and perhaps indefinitely, postponed.

Fortified by these authorities, as well as by some formerly quoted, I again assert, that the only truly scientific view to be taken of this department of Physiology is, that its object is to ascertain, by the method of induction, to use again the expressions of Professor Whewell, "when, and in what manner and degree, *chemical* as well as mechanical agencies are modified, overruled, or counteracted in living bodies, by agencies which must be *hyper-chemical* as well as hyper-mechanical;" and I farther maintain, that the term Vital Affinity is as accurate a term as can be employed as a general expression for these agencies; that, like all other general principles in nature, we may expect it to act according to general laws, and that several of these laws, to which I have referred in this and former papers, are already ascertained, at least, in so far as to shew that the subject is one of legitimate inquiry.

I am aware that it may be still said that this dispute is only a verbal one, and can have no practical or even strictly scientific application. But in answer to this I would observe, that so long as we adhere to the supposition, that there is nothing truly vital or peculiar to living bodies in their economy (as regards their organic functions), except motion, and that motion derived from contraction of solids and impulse, the notions that we can form of the nature of these functions in health, and of the deviations from that state in disease, *must necessarily be erroneous*, because we shall always be looking in the wrong direction for the cause of these phenomena; and at this precise point the most plausible medical theories of the last, and even of the present age, have gone astray. This, I think, is sufficiently illustrated by the example already given, of the ingenuity of Dr Murray wasted in the invention and defence of the hypothesis which ascribed the secretions of animals to varying impulse on their fluids from contracting solids; and I shall only add a single illustration of the same kind drawn from the science of Pathology and from the most fundamental of all inquiries in it, the theory of Inflammation. It being sufficiently obvious, that inflammation is strictly a vital process, and one in which the flow of blood through the affected part is materially changed, it was naturally supposed that the vital powers by which that movement is affected in the natural state, must be those which undergo modification in this diseased state; when, therefore, it was believed that the only truly vital power concerned in the organic functions of the living body is one form or other of contractility, the only explanations of the phenomena of inflammation that were attempted turned on the possible modifications of the contractile *powers of vessels*, as influenced by their contents or through their nerves. But I believe it is now pretty generally admitted, that all this was nearly lost labour; and if physiologists had earlier seen that the most fundamental and characteristic of all strictly vital actions,—those by which nutrition and secretion are effected, and which have always more or less of a chemical character, take place, not in vessels, but in cells, independently of any contractions of the organs containing the fluids,—that they are most obvious in those living beings which have neither heart, arteries, nor veins;—and that, as occurring in the higher animals, they are carried on partly in the interior of the fluids contained in the vessels, and partly in the matter that has exuded from the vessels and lies exterior to them,—they would sooner have perceived, that all the changes of action *of the organs* of circulation, heart, arteries, or capillaries, in the case of inflammation, are to be regarded as *effects* of the truly essential, fundamental, and strictly vital changes, which take place *in the fluids* of an inflamed part, and in the *relation between the fluids and solids* there ; *i. e.*, in matter which is apparently at rest, and much of which, being outside the vessels of the part, has escaped from all influence of the vital contractions either of heart or vessels.

I do not say that we have a satisfactory explanation of inflammation merely by taking this view of it,—regarding it as fundamentally a perversion of nutrition or secretion, and the circulation as only secondarily affected ; but I maintain that in this way we can understand, and so far explain, by reference to more general facts, known in the history of the sound as well as the diseased body, many facts as to it, which we never understand at all so long as we think only of *altered action of vessels,*—but which are easily arranged along with others previously known, when we regard them only as indications of changes in vital actions that are constantly going on *in living fluids*, both those contained in vessels, and those recently delivered from them, into the cellular structure *of living parts.* Thus, we can perceive how inflammation should *spread,* as it does, not along the course of vessels, but *from a point as from a centre,*—not only along *continuous* surfaces, but to *contiguous* surfaces lying beside them, but supplied from other vessels, the larger branches of which frequently undergo little or no change in the process. Thus we can perceive how the amount of effusions and exudations from the blood in inflamed parts should bear no fixed proportion to any action of the heart, or of any contractile organ by which it is propelled into those parts ;—the most copious effusions sometimes taking place when the impulse of the blood, passing along the larger arteries, is distinctly feebler than natural during the whole disease. Thus we can understand how the blood passing through an inflamed part should undergo a change in its own constituents, and how the fluid, which escapes from the vessels there, should possess a peculiar composition, and be peculiarly fitted for certain vital actions, and thereby for repairing some of the injuries resulting from the inflammation itself. Thus, also, we can understand and admit a principle which has been confidently disputed, but which I have long thought, and now find to be maintained, as fairly established, viz., that matter exuding as a result of simple inflammation, may afterwards degenerate, according to the state of the constitution, into various forms of heterologous deposit.—(*See e.g. Copland and Quain, in Medico-Chirurgical Transactions*, vol. xxxiii., p. 144.)

Still more, if we regard it, as I think we may, as an established fact, that the vital properties of living fluids, as well as solids, are of temporary duration only, and are subject to the general law of increased action being followed by diminished action, or accelerated loss of vitality, we can understand how the most important consequences of inflammation, both beneficial and injurious, should be produced;—how the matter that was concerned in it being peculiarly excited, and, therefore, quickly rendered *effete*, should be peculiarly liable to Absorption, which we know to be the agent by which its injurious effects are chiefly effaced;—how the increased absorption should, under certain circumstances, extending to the adjoining sound parts, effect that destruction of texture which we call Ulceration; and how, in other circumstances, either of peculiar violence of the inflammation, or depressed vitality of the organ inflamed, this form of diseased action should, by the established laws of vitality, lead to premature death of the diseased part, *i. e.*, either to partial Sloughing or more extensive Gangrene. All these are facts of the highest practical importance, of which we have explanations so far satisfactory, on the strict principles of induction, when we look to the changes that take place in inflamed parts in those living actions which I have referred to the heads of Vital Attractions and Repulsions, and Vital Affinities. But I will venture to say, that we never shall have any explanation of them consistent with the supposition, that the contractions of living solids are the only changes in organic life which are truly vital, *i. e.*, dependent on laws essentially distinct from those that regulate the changes of inorganic matter.

ART. VI.—*Adulterated Medicines in the Country Districts of the United States.* By A. WILLARD, M.D., of Greene, New York. (New York Journal of Medicine, vol. viii., No. 3. New Series. May 1852.)

The following remarks form the substance of a Report made to the Chenango County Medical Society, in pursuance of a resolution adopted by the Society for the purpose of carrying out the request of the United States Medical Association, as expressed in a resolution offered by Dr Huston, Chairman of the Committee on Spurious and Adulterated Drugs, and adopted by the Association at its meeting in May 1850.

The Government of the United States has wisely appointed an officer, whose business it is to inspect all imported drugs and chemicals, and to permit none to be entered at the different customhouses, excepting such as are pure and unadulterated. This duty is undoubtedly performed with all the care and attention which the framers of the law contemplated; at least we are at liberty to suppose that such is the case; so that the importer and wholesale dealer are, in a great measure, protected from frauds in their purchases of *foreign* articles. But it does not necessarily follow, that the retailer and the consumer are equally safe from imposition; nor is there any law to prevent abuses in the home manufacture of chemicals, or in the preparation of those compounds by the apothecary, which are in constant and daily use by the physician.

Every medical practitioner in the country knows full well, how often he is disappointed in the effects which he expects to obtain from the exhibition of certain remedies,—remedies which, he has the best authority for believing, are to produce certain positive and unequivocal results,—results for which he waits anxiously, but too often waits in vain. His trials of an article which he purchases as perfectly pure, not unfrequently lead him into the firm belief of its inutility, or, still worse, of its absolute injuriousness to his patient, while the article in its purity, if it could be thus procured, would be found to possess all the valuable properties ascribed to it.

We do not wish to make wholesale charges; but we cannot doubt the fact, that there is no traffic which opens so wide a door for fraud, imposition, and iniquity, as the trade in drugs, and the manufacture of chemicals and pharmaceutical compounds. And it is not alone in the more costly preparations of this sort that fraud and imposition exist. Even the cheapest are not only adulterated, but sometimes an article of the kind is found which contains not one particle of the substance which it purports to be. For instance, we have now in our possession a specimen purchased for precipitated carbonate of iron, which was nicely bottled and labelled with what purported to be the manufacturer's name, which consists entirely of Spanish brown. Another article was purchased for litharge, which it is believed contained no particle of lead, but seemed to consist entirely of some yellow earthy substance, such as yellow ochre, or some other cheap material of the kind. Most practitioners in the country are in the habit of preparing their own tincture of muriate of iron. That which is purchased from the apothecary is so variable in its strength, that it is not to be depended on; and, indeed, that which they prepare for themselves is little better, in consequence of the very great impurity of the precipitated carbonate, which is generally used in its manufacture. We have seldom been able to dissolve more than one-half or two-thirds of the iron, and of course the preparation varies in strength in proportion to the amount of iron it contains.

If, however, a pure carbonate be formed, the acid will dissolve every particle of it, and the resulting tincture will be found to possess all the valuable properties which are expected to be found in it.

Sweet spirits of nitre is an article, which it is extremely difficult to find in the country of equal and uniform strength. It is manufactured either by the chemist or the drug-seller (we do not exactly know which) of all sorts of strength, to suit purchasers, and hence it comes to us labelled with a multitude of F's, from a round half-dozen or so, which are supposed to indicate the different degrees of strength, down to that which is not considered worthy of being dignified with any F at all. This last is the preparation which is most usually brought into the country, and it not unfrequently requires an individual of a most exquisite nicety of taste and smell to distinguish it from ordinary whisky. Precisely the same remarks will apply to aqua ammoniae. Perhaps there are scarcely two samples of this article which contain the same amount of ammoniacal gas, so that, in ordering it for internal exhibition, the prescriber never knows the exact amount of the alkali he directs.

It would evidently be an improvement, if both this and spirits of nitre could be prepared of uniform strength for internal use. Aqua ammoniae is frequently required of greater strength for external application, so that there would seem to be a necessity for two preparations. But no such reason exists for the multitude of F's that are attached to the various samples of spirits of nitre; indeed we believe that no reason can be given for this, aside from the cupidity of the manufacturer.

Occasionally castor-oil is found adulterated with some cheaper oil,—perhaps lard-oil. If thus adulterated, the taste is not materially altered; perhaps it may be somewhat improved; but the activity of the remedy is very much diminished, so that it becomes almost impossible to apportion the dose in such a manner as to be at all certain of its effects. In an article so much used as a household remedy as this, this iniquitous adulteration is much to be regretted.

We have recently been shewn a specimen of olive-oil adulterated probably with lard-oil. Its appearance was very fine, nicely bottled and labelled, and every way calculated to deceive the eye; but its impurity was readily detected by the taste, which indicated pretty conclusively that the foreign oil was procured from half putrid materials.

The compounded spirits of sulphuric ether (Hoffman's Anodyne) is seldom found in the country. The spirit of sulphuric ether is sold for it, which contains not one particle of ethereal oil, the ingredient to which the former remedy owes its peculiar virtues.

The compounded spirits of lavender is a preparation which perhaps never comes to us in the shape in which it is directed to be made by the Dispensatories. The various writers on pharmacy state that it is a delightful compound,—an elegant preparation,—a grateful cordial; but we, at least, have never been able to procure it in so delightful, elegant, and grateful a form. On the contrary, that which we have usually procured exhales anything but the delightful and pleasant aroma of fresh lavender and rosemary. We are led to believe, that it is now generally, if not always, made, by dissolving the essential oils of lavender, rosemary, and cloves in alcohol, in very variable quantities, to suit the notions of the compounder, and colouring the mixture with red sanders. If fresh oils were used, this might be a very tolerable substitute for the officinal preparation, always providing the oils were pure. The oil of lavender ordinarily used by the apothecary is probably procured from the broad-leaved variety of the plant, instead of the narrow-leaved, which is more costly as well as more fragrant. The former variety smells pretty strongly of turpentine, and both are not unfrequently pretty largely adulterated with it, so that, in the compound we are considering, we get a most villanous essence of turpentine instead of lavender.

We frequently get Croton-oil in the country which will not even produce redness of the skin. It is needless to say that some cheap oil is mixed with it.

It is perhaps useless for us to speak of the very extensive adulterations of those medicines which come to us in the form of powders. Their inefficiency is well known. Among these ipecacuanha, rhubarb, and jalap are frequently so diluted by the addition of inert substances, that it is difficult to designate a proper dose; and many times, an amount is required that is extremely inconvenient to the patient, and not a little annoying to the presciber.

We presume that, in the cities, with the aid of Government examiners of drugs, Colleges of pharmacy, Pharmaceutical Societies, and sundry other appliances, suited to keep the trade within the bounds of propriety, the sale of adulterated drugs is very much lessened; at least, we so understand from various sources; but we must be allowed to doubt, whether the law with all its terrors, aided by all the appliances aforesaid, has made men in any degree more honest than they were before it went into effect, unless it be upon compulsion. That there are more bad drugs in the country than heretofore is perhaps not the fact; but that the quantity is materially lessened, is very much to be doubted. The reason, or at least one reason, for this is, that in the country but very few in proportion to the whole number that sell drugs, know any thing at all about the trade; many not being able, indeed, to distinguish one drug from another, except by the label on the package. We have known Peruvian bark sold for rhubarb, *uva ursi* for buchu, and Virginia snake root for pink root. The object of the country trader is very much the same as that of the merchant princes, that is, to make money, and whatever purchases they make, are made with a single eye to the expected profits, and whatever will afford a profit is considered a legitimate article for traffic. Hence a country store is a sort of "*omnium gatherum*," the contents of which would put entirely in the shade the multifarious catalogue of the famous Mr Caleb Quotem.

As traders most usually purchase drugs for the sake of the profits their sales will yield, the quality is the last matter inquired about;—the cost is the principal thing; and whether they will yield a fair per-centage is the question; and there are to be found in the cities, plenty of very accommodating gentlemen, who are not only willing but anxious to sell drugs at almost any price, at which the purchaser may require them.

Hence it will be seen that the country is flooded with impure and adulterated articles, in consequence of ignorance of the quality on the one hand, and insatiable cupidity and recklessness of human life on the other.

ART. VII.—*Upon the Diseases of the Isthmus of Panama.* By JOHN A. LIDELL, M.D., of New York. (New York Journal of Medicine, New Series, Vol. viii., No. 3.)

In an article published in the last number of this Journal, some general views were presented concerning the climate and the diseases, especially of Europeans and Americans, at Navy Bay, Chagres, and in the valley of the Chagres river. The morbific influences of malaria or marsh miasmata, of the high range of atmospheric temperature, moisture, &c., were stated at some length, and in a general manner. In the present paper we propose to continue the same subject, by giving a special description of some of the diseased states of the human body, generated by these morbific agents; using for this purpose, observations made at the above-mentioned places, during the dry and the commencement of the rainy season of 1851.

I.—OF THE CLIMATE FEVER.

This is the most common disorder of that country. Of 382 patients treated in the hospital at Buyo Soldado on the Rio Chagres, 250 or nearly two-thirds had the climate fever. Most strangers are attacked by it in the course of a few weeks after their arrival. At Chagres and Panama, it has acquired, among foreigners, the surnames of those places respectively. This disease is paroxysmal in character, and identical in many of its features with the remittent fever, so common during the summer and autumnal months in most parts of the United States.

Its symptoms vary much, according to the pre-existing pathological states of the organism, the severity of the seizure, and for reasons that are not understood. The symptoms which usually mark its accession are languor, lassitude, weariness, yawning and stretching, aching pain in the bones, and chilliness, followed by heat and dryness of the skin, acceleration of the pulse, general diminution of the secretions, flushed countenance, and headache. In some cases, the paroxysm is ushered in with a well-marked rigour, but in other cases, even chilliness is wanting, and in still another class of patients, the chilliness alternates with flushings of heat. Pain in the head is sometimes present in the forming stage, and commonly, but not always, accompanies the hot stage. The patients generally complain of, and exhibit by their actions, much debility, both during the continuance of the disease, and for a variable length of time after it has passed away. At the expiration of from twelve to sixteen or eighteen hours, according to the severity of the attack, the intensity of the febrile symptoms begins to be lessened, the skin becomes cooler, the pulse less frequent, and the patient says he feels more comfortable ; in short, a decided remission occurs. At the end of about twenty-four hours from the commencement of the paroxysm, the intensity of the febrile symptoms is again increased, an exacerbation takes place, except such a result has been prevented by timely medication ; and in general, without such timely interference, the severity of each succeeding exacerbation will constantly be increased, a result which I witnessed several times in persons who could not obtain medical assistance till after the lapse of several days, or would not apply for medical assistance till the severity of their sufferings compelled them to do so.

We next mention a class of patients in whom the attack commences without a chill, or even chilliness, and terminates at the end of twelve or fourteen hours in a well-marked intermission, profuse perspiration being present. These cases seem to be a sort of intermittent fever, without the cold stage, and are not unfrequent in occurrence. We also sometimes see during the height of an exacerbation, transient and partial perspirations alternating with hot flushings of the skin. We now proceed to notice a very important class of patients, in whom no well-marked remission can be detected till after the lapse of three or four days. But this result must be considered as having been occasioned by a complication or lesion of some tissue or organ (which may be either accidental or otherwise) accompanying the malarious fever, and essentially modifying its symptoms, progress, and treatment. Thus, irritation of the stomach and intestines, congestions and inflammations of these and other organs, are known to produce such a result, and the fevers accompanying them, whether sympathetic or idiopathic, are apt to be more or less persistent in character.

From this point of view, the complications of malarious fever are seen in their true light, and their diagnosis and treatment seem to fitly illustrate the superiority of the sound pathologist over the empirical practitioner.

In this connection it may be well to notice the most important complications with the climate fever, and the symptoms peculiar to each of them. The *bilious* is deserving of mention before all others, both on account of its severity and the frequency of its occurrence. When this complication is present, the patient has, in addition to symptoms already narrated, nausea and more or less copious vomiting of bilious matter, bitter in taste, and greenish-yellow in colour. The bilious vomiting may commence at the outset of the attack, or occur at any moment afterwards. His tongue is usually covered more or less thickly with a yellowish coat, and its papillæ may be large and distinct. He may also have more or less tenderness on firm pressure at the epigastrium and right hypochondrium. In some cases, even at an early period, the conjunctivæ and the whole surface of the body exhibit a jaundiced hue, and bile can be detected in the urine. By these symptoms we recognise bilious remittent fever. Another complication of frequent occurrence is the *gastric*, the symptoms of which, in a well-marked case, are nausea and distress in the stomach, tenderness at the epigastrium under pressure, vomiting, intolerable thirst, and if drinks be swallowed copiously, they are directly vomited up again. There is retching, and if the stomach is nearly empty, a little bile may be thrown off. The tongue is usually more or less coated with a whitish fur, and it may be reddish about the tip and edges.

Again, another rather frequent complication which deserves a notice at our hands, is the *enteric*. When this is present, the patient has more or less distress in the belly; he sometimes complains of a constant burning pain in the abdomen; he has diarrhœa of greater or less urgency; the discharges are thin, consisting of mucus, or muco-bilious matter mixed with fæces in varying proportions. The stools are often acrid, and exhibit a bright yellow colour. There is also more or less tenderness of the belly under pressure, which is often most marked in the tract of the small intestines.

These superadded to the usual symptoms of malarious fever, are, according to my observations, the signs by which each of the three complications may, for the most part, be recognised.

We have also to mention that two of these complications are often co-existent in the same case. For example, the *hepatic* or *bilious* is almost always accompanied by the *gastric;* the *enteric* is sometimes associated with the *gastric*, and occasionally all three of them are present in the same subject.

The climate fever is usually associated with one or more of these complications. The rationale of this was sufficiently explained in a former article, and it does not seem to be necessary to repeat it here. But such is not invariably the case; for I both suffered in my own person, and saw others have the fever, unattended by marked disturbance of the hepatic function, unattended by marked irritability of the stomach and intestines. However, we must not be understood to say that, in such cases, the bile is perfectly normal in quantity and quality, or that the function of digestion is performed as well as in health, but that the disturbance of the liver, stomach, and intestines is not so great as to deserve the name of a complication; for, in such cases, those organs are only exhibiting the effects of malarious poisoning in common with every other part of the body.

Upon the pathological anatomy of the climate fever, and its so-termed complications, we have not much to say. Observations upon such a subject, unless they are carefully drawn from numerous and skilful dissections, are more or less hypothetical in their nature, and are more or less calculated to mislead. However, a strict interpretation of the vital phenomena, according to what is now known concerning the pathological anatomy of the mucous membrane of the alimentary canal, renders it probable that the *gastric* and *enteric* complications, in most cases, consist essentially of a hyperæmia (congestion) or a catarrhal inflammation of the gastric and enteric mucous membrane, of varying intensity. This may, at first, amount only to catarrhal irritation (simple catarrh), and pass afterwards into the higher grades of inflammatory action. It may result from mechanical or chemical irritation of the gastro-enteric mucous membrane, affected by the acridity, excessive quantity, or indurated consistence of the intestinal contents; or it may be developed in consequence of congestion or venous stasis in the portal system. It either attacks the mucous membrane uniformly, or is developed mainly in the villi and follicles. It may run an acute course, or degenerate into a chronic form. Besides these there is probably another abnormal condition of the gastro-intestinal mucous membrane, which is sometimes coexistent with malarious fever. We refer to the so-called non-inflammatory softenings. They would be found only in subjects suffering from a general cachexia and atrophy, or who had experienced frequently repeated attacks of the fever.

Under the general term Bilious Complication of the climate fever, are probably embraced several abnormal states of the liver which resemble each other only in the disturbance of the biliary function which they occasion, but are widely different in their essential character. Among these may be mentioned, first, hyperæmia or congestive turgor, including both passive hyperæmia, dependent upon torpor in the portal vascular system, and active hyperæmia, resulting from idiopathic or consensual irritation; second, sub-acute inflammation of the hepatic parenchyma; third, catarrhal irritation or inflammation of the mucous membrane of the biliary passages; and fourth, pre-existing abnormal states of the liver, such as the fatty degeneration, and the nutmeg liver, particularly that variety of it which consists of hypertrophy of the white or so-called secreting substance, with enlargement of the capillaries of the biliary canaliculi, resulting from excessive secretion of bile and stasis of the secretion, and accompanied by hyperæmia of the portal bloodvessels. The inflammation of the biliary mucous membrane, closely resembles that of the gastro-enteric mucous membrane, and is often co-existent with it.

Treatment.—The indications to be followed in the treatment of climate fever are threefold; first, to moderate the febrile excitement, and produce a remission as soon as possible; second, to prevent complications when they do not exist, and to remove them when they are present; and third, to prevent the recurrence of the paroxysms.

The first indication is best accomplished by rest; the patient should remain in bed, which almost always he is glad to do, on account of feeling much debilitated;—by the administration, in suitable quantities, of the refrigerant drinks, such as cold water, lemonade, tamarind water, cream-of-tartar water, and liquor potassæ citratis;—by cool or tepid spongings of the surface of the body; and by the administration of gentle laxatives. The last class of remedies always answer a useful purpose. The contents of the intestinal canal, under the circumstances supposed, are generally more or less acrid in quality, and by their removal an abiding source of irritation is destroyed, and in some cases a complication is prevented. The laxatives which are mildest and at the same time effectual, are the best. We used castor-oil, Seidlitz powders, magnesia, sulphur, cream of tartar, magnesia calcinata, powder of rhubarb and magnesia, but generally gave the preference to castor-oil. When the secretions were very scanty we usually administered five, ten, or even fifteen grains of blue mass, and directed it to be followed in a few hours with a dose of castor-oil or a saline aperient, In case a mercurial was administered, acidulated drinks were prohibited. A weak infusion of camomile, taken cold, constituted a grateful drink for many patients. The neutral mixture, liquor potassae citratis by slaking thirst, promoting diuresis and diaphoresis, seems to be a useful remedy. At the same time all food was interdicted, or only barley water, rice water, thin arrow-root, and thin gruel were allowed. In this simple manner the treatment of an uncomplicated case of climate fever was conducted till a remission occurred, which was denoted, as already mentioned, by a partial subsidence of the febrile symptoms. The time had then arrived for the employment of another class of remedial agents, namely, the antiperiodics, for the purpose of preventing exacerbation and arresting the febrile movement. Of these the best is the *sulphate of quinine.* I made many observations for the purpose of determining the average quantity of this medicine required to arrest the paroxysms of malarious fever on the Isthmus, and found it to be fifteen grains. The usual method of administering it was as follows: five grains in substance, mixed with a little syrup or mucilage, immediately on the occurrence of the remission; five grains about the middle of the same period; and another five grains about one hour before the expected recurrence of the exacerbation. When the patient could not take quinine in substance, we commonly gave a pill containing two grains of the remedy every hour, commencing with the remission, and continuing till the time for the exacerbation had passed by and the febrile symptoms had given place to profuse perspiration. In this way we almost always arrested the simple climate fever without difficulty, especially when proper preparatory treatment had been employed.

Arsenic, as an antiperiodic, received but a limited trial at our hands. I administered to myself Fowler's solution for a short time, but was forced to suspend it, on account of irritation in the gastro-enteric mucous membrane. And speaking in general terms, the irritable state of the abdominal mucous membrane in patients on the Isthmus, restricts its use to very narrow limits. Besides, the effects of arsenic as an antiperiodic are not speedy enough to adapt it to the treatment of remittent fever.

We have thus briefly sketched the treatment of simple or uncomplicated climate fever. Except two or three points, *opium* is a remedy which seems to possess the power of abbreviating the hot stage, but the propriety of administering it for that purpose is more than doubtful in many cases, because it diminishes too much the secretions of the internal organs. Patients often have, during the height of the exacerbation, an intolerable headache. This is most easily relieved by the local use of cold water or evaporating lotions. During convalescence, patients are often troubled with profuse perspiration. This is for the most part easily remedied, by administering about one drachm of the acidulated solution of quinine three times a-day.

We must next describe the treatment of the complications, the symptoms of which have already been given. For the gastric the following method was employed. If there was much tenderness at the epigastrium under pressure, two or three ounces of blood were taken by cupping ; if the tenderness was slight, a sinapism was applied; and both were usually followed with either hot fomentations or a warm poultice, applied over the affected part, and kept there till the tenderness had nearly disappeared. To control the vomiting and retching, we used effervescing draughts, liquor calcis with mucilage, the recumbent posture, prohibiting all drinks as long as necessary. Pounded ice would have been a useful remedy, but we had none. Hydrocyanic acid was also sometimes employed. After the vomiting ceased, we administered the neutral mixture with mucilage, applying, at the same time, the treatment proper for malarious fever, but avoiding as much as possible the internal administration of irritants.

The bilious complication was treated as follows. If there was well-marked tenderness in the right hypochondrium, cupping was employed to the extent of four or six ounces, and a large warm poultice was applied over the same region and kept there for some time. The bilious vomiting was at first encouraged by drinking freely of warm water, after which it sometimes declined spontaneously, or, in most cases, was readily controlled by remedies already mentioned. As soon as it can be retained on the stomach, a saline cathartic (the salts of potassa were best) was administered for the purpose of producing diuresis and large watery evacuations from the bowels, whereby we hoped to diminish the volume of the portal circulation without too great a sacrifice of the patient's strength. If the hepatic tenderness remained after cupping and faithful poulticing, a large blister was applied directly over the affected part. In some cases, where vomiting was a persistent system, we have seen large doses of calomel (from 20 to 30 grains) administered with apparent advantage. To quiet the patient at night, and give him needful repose, his body and limbs were sponged with tepid water, and he took a suitable dose of morphia.

For the enteric complication we gave the following treatment. If there was much abdominal tenderness, a few ounces of blood were abstracted locally by cupping, after which the belly was poulticed. If the tenderness was slight, instead of cupping a sinapism was applied, and followed also by a warm poultice. To effect the expulsion of the acrid contents of the intestinal canal, a mild laxative was given, such as five or ten grains of blue mass, followed by calcined magnesia, or castor-oil, combined with a little laudanum, or solution of sulphate of morphia, to prevent griping. Mucilage was administered internally ; and none but the blandest kinds of food, such as arrow-root, well-prepared flour, and rice water, were allowed. Avoiding carefully whatever might increase the local disorder, and applying cautiously the principles already laid down for the treatment of paroxysmal fever, we generally had the satisfaction of seeing our patients convalesce rapidly.

Of Emetics.—Dr Mackintosh, in his Practice of Physic, says,—" Emetics have been often extolled, but I believe every experienced tropical physician will agree with me, in cautioning young practitioners against their indiscriminate employment. Irritability of the stomach is one of the most frequent and troublesome symptoms; and once excited, it is always difficult, and in many cases impossible, to restrain it. I have seen emetics exhibited, and the vomiting has continued till death in spite of every remedy." This advice, against the indiscriminate employment of emetics in the treatment of tropical fevers is certainly judicious. But still there is a class of cases in which they can be used with safety and with manifest advantage. There are patients whose stomachs are loaded with food at the outset of the attack, or with acrid secretions, without tenderness at the epigastrium. A gentle emetic of ipecacuanha, with diluent drinks, administered to them, does good by removing speedily a powerful source of irritation, in this manner occasionally even preventing the occurrence of a severe gastric complication. But if no such reason for prescribing an emetic exists, the irritation occasioned by its presence in the stomach may be productive of much harm,—a state of catarrhal irritation may be aggravated into positive inflammation, and an inflammatory condition of the gastric mucous membrane may be intensified. Neither must it always be taken for granted, that, because the patient has nausea and vomiting, the stomach contains acrid substances ; for, in severe cases of the gastric complication, these symptoms are present though the organ is nearly empty.

Of Mercurials.—Calomel and blue mass have been, and are now, used so extensively, and with such apparent advantage in the treatment of tropical fevers, that, at first sight, it may seem an act of temerity in us to offer any strictures concerning their use. We have, however, had occasion to notice, on the Isthmus of Panama, that the people generally are much more susceptible to mercurial influence than the inhabitants of temperate climates; that they are salivated more speedily, and with smaller quantities of the drug. We also observed that fever patients generally, who had been salivated either accidentally or otherwise, while under treatment, could not be discharged from hospital so soon by several days as those who had not been salivated; that their convalescence was more protracted, and their recovery seemed to be less complete. Our experience is corroborated by that of other observers. While, therefore, we readily admit the great value of the mercurial preparations, as antiphlogistics, alteratives, and cholagogues, it is our duty to declare that some caution should be used even in administering them to persons suffering from tropical diseases; and that, according to our experience, thirty grains of calomel can seldom be taken with impunity by a patient having simple climate fever.

The principal cautions to be observed are the following:

1st, Never to administer mercurials except to accomplish a specific purpose.

2d, To use the mildest form which will accomplish that purpose; and,

3d, To use the smallest quantity necessary to produce the desired effect; and,

4th, When mercury has been administered as an alterative or a cholagogue, to make it be followed in a short time with a laxative.

By attention to these rules, all the advantages to be derived from mercurials will be obtained, and many of their unpleasant consequences will be avoided.

II. OF CONGESTIVE FEVER.

This is not a disease *sui generis,* but one of the forms of malarious fever. Strictly speaking, it should have been described as climate fever with the congestive complication. But inasmuch as the object we have in view is to present a clear, though brief, description, rather than an accurate terminology of the diseases of the Isthmus, we shall not in this instance depart from the nomenclature in common use. The term *Congestive* has been applied to this form of malarious fever, because its most prominent symptoms are produced, for the most part, by a sudden retrocession of the blood from the external surface of the body, and a corresponding increase in the quantity of the circulating fluid in the internal organs; (Congestion). Greater or less abnormities in the distribution of the blood, among the various parts of the body, are present in every paroxysm of paludal fever; but the term *congestive* should be applied only to cases in which the symptoms are well marked, or even alarming in character.

These symptoms vary much, according to the seat, extent, and intensity of the congestion. The general symptoms (*i.e.*, those which are present in every well-marked case) are the following. The attack is sudden; the surface of the body speedily becomes cold, shrunken, and bedewed with moisture; the countenance is pinched and pale or livid; the eyes are sunken; the voice is hollow and weak; in many cases, the patient can scarcely speak louder than a whisper; the breath is cold; the pulse feeble, sometimes it is scarcely perceptible at the wrist, and the patient, if conscious, complains of general and extreme debility. If the lungs are the suffering organs, in addition to the symptoms just mentioned, the respirations are frequent, short, and anxious, and the patient complains of dyspnœa, orthopnœa, or even says he can scarcely breathe. If the abdominal viscera are the seat of the principal congestion, the patient complains of a feeling of excessive fulness, or even pain, in the belly, and his countenance in many cases presents a dusky hue. Copious vomiting and purging of bilious matter are often present; also convulsive movements of the extremities, or cramps occasioned by eccentric irritation, located probably in some cases in the alimentary canal. If the brain is the organ invaded, the symptoms are stupor, or even coma, with stertorous breathing, an infrequent, slow, and weak pulse, and contracted or dilated pupils. Again, if the spinal column is deeply involved in the congestion, the patient has a feeling of great uneasiness in the back, or even pain, and in many cases cramps, which are commonly most marked in the lower extremities. This we witnessed several times.

Diagnosis.—The only disorder for which a well-marked case of the congestive form of malarious fever might be mistaken is Asiatic cholera. The collapsed appearance of the patient, the cold, clammy, and shrunken or washerwoman appearance of the skin, the feeble pulse, the weak, husky voice, and the distressing cramps, vividly recal the last-mentioned disease to the mind of the observer. The differential diagnosis is founded on the following points. 1*st*, In congestive fever, the evacuations which have been termed characteristic of cholera are invariably absent. The patient may vomit, but the matter ejected is bilious, and does not resemble the " rice water." At the same time he may have frequent and thin stools; but instead of the choleric evacuations, they are generally bilious or muco-bilious in character. 2*d*, The type of the prevailing diseases assists in framing a diagnosis. If the severer forms of paludal fever are common, and not a single case of cholera has been seen for a long time, the probability is very strong that the patient has congestive fever. And; 3*d*, The effect of remedial agents should not be overlooked. If this should answer no other purpose, it may serve in some degree to verify the diagnosis.

Treatment.—The first indication is to prevent further depression, and to facilitate or hasten reaction. This we sought to accomplish by external stimulation. We directed bottles of hot water or hot stones wrapped in cloths to be placed in the axillæ, and about other parts of the body, the extremities to be diligently rubbed with oil of turpentine, and a suitable increase in the quantity of the patient's bedclothes to be made. We also caused large sinapisms to be applied to the patient's body, and kept there till reaction had fairly commenced, shifting them from one spot to another as often as the pain occasioned by their use should seem to require. In some cases we directed dry cupping to be applied directly over the organs most intensely congested. We did not administer any of the diffusible stimulants internally, except in a few hopeless cases,—cases which were rendered hopeless by the feeble condition of the patient at the time of the attack, or by important pre-existing pathological lesions. If the congestion was located principally in the abdominal viscera, a purgative dose of calomel (20 grains and upwards) was administered. If distressing cramps were present, anodynes (opium and morphine) were prescribed for the purpose of mitigating the patient's sufferings, till the cause which had produced them could be removed. To check the vomiting, and to allay the intolerable thirst which was sometimes exhibited, we gave effervescing draughts, allowing the patients at the same time to drink fluids but sparingly. Pounded ice would have been very useful for the same purpose.

By the diligent use of the various means just mentioned, reaction was generally established in the course of a few hours, after which the febrile excitement always ran very high. To diminish the excessive febrile reaction is therefore the second indication to be followed in the treatment of congestive fever. This we endeavoured to accomplish by the removal of all the irritants which had been used so freely during the cold stage, by enjoining rest and quiet, by tepid spongings of the body, and by the administration of refrigerant drinks. When the febrile movement seemed to be uncontrollable by other means, we have seen patients wrapped in wet sheets with speedy and well-marked benefit. This procedure is effected in the following manner. A sheet wet with cold water is spread over a mattress, and upon this the patient is laid, and the free edges of the sheet are turned over his naked body. Another wet sheet is then placed or spread upon the patient, and its free edges are tucked under him. Outside of all, two or three woollen blankets are placed. In this manner the patient is completely inclosed, except his mouth and face, in a watery envelope. The procedure was generally grateful to the patient.

Thus we were generally able to obtain a remission within twenty-four hours from the attack, when the time had arrived to fulfil the third indication, or to prevent the occurrence of another paroxysm. This was accomplished by the administration of quinine in large doses (from 10 to 20 grains), commencing with the remission, and repeating them at short intervals, till the constitutional effects of the remedy, ringing in the ears, partial deafness, or blindness, &c., were produced. By such prompt and liberal use of this antiperiodic remedial agent, a recurrence of the paroxysm was invariably prevented. In regard to the administration of quinine during the hot stage, we cannot speak in terms of unqualified praise, for we several times saw large doses given, under these circumstances, with anything but relief to the patient.

We have yet to notice the treatment of certain sequelæ or results of the morbid process under consideration. After the paroxysms have been arrested, the organs most deeply involved during the cold stage are apt to retain a congested condition. This we endeavoured to remedy mainly by dry cupping and counter-irritation. For such lingering congestion of the brain, we applied blisters to the nape of the neck and to the inside of the thighs, dry cups to the temples, with cold applications to the head, and the use of purgatives, if the patient was not too weak, or his gastro-enteric mucous membrane too irritable to bear them. For the relief of chronic congestion of the abdominal viscera occurring in this manner, we employed dry cuppings and large blisters applied directly over the congested organs, with manifest advantage. At this stage of treatment, we did not meet with a single case in which the general or local abstraction of blood seemed to be necessary. In many cases, even local blood-letting was not advisable, on account of the excessive debility of the patient. Some caution is necessary in the use of blisters on the Isthmus of Panama. They should not be allowed to remain on too long, because the sores thus produced are sometimes extremely difficult to heal. Blisters should be applied only till their full *rubefacient effect* has been produced, and then the cuticle should be raised by a warm poultice. They should also be dressed frequently and carefully, because all of them, and more particularly those on the back of the neck, are liable to become attacked by maggots.

An idea of the relative frequency of *congestive fever* can be formed from the hospital record at Buya Soldado, already referred to. Of *three hundred and eighty-two* patients, *twenty-three*, or rather more than one-seventeenth, had congestive fever. This disorder was most rife during the middle and latter part of the dry season, according to our observations. Many of the subjects attacked by it were young and robust, while others had been enfeebled by recent sickness. We noticed a proclivity to it among patients convalescent from dysentery, and these likewise were by far the worst cases.

III.—OF CLIMATE FEVER IN THE TYPHOID STAGE.

This occurred for the most part in persons who were enfeebled by previous attacks of fever, or who had injudiciously administered to themselves *irritating purgatives*, and especially *alcoholic stimulants*, either for the gratification of a morbid appetite, or with a view to relieve themselves from the debility which both accompanies and follows an attack of the fever. Old drinkers seemed to be much more liable to it than temperate people. An attack of malarious fever with the gastro-enteric complication occurring in an intemperate subject, exhibited a tendency to run into it, especially if judicious treatment was not employed.

Symptoms.—The patient has generally been sick several days, and may be more or less emaciated; his eyes and countenance exhibit a vacant expression; his tongue is either red or brown, and partially or completely dry. He has low muttering delirium and sleeplessness, a dry, hot skin, a frequent and more or less feeble pulse, abdominal tenderness, muscular tremors, great debility, diarrhœa, with thin and small stools, consisting principally of muco-bilious matter, often bright yellow in colour, and sometimes tinged with blood, attended with abdominal pain, and more or less tympanites. If the case proceeds from bad to worse, the patient gets sordes on the lips and teeth, subsultus tendinum; he slides down towards the foot of the bed, passes his urine and fæces unconsciously; and finally coma and death terminate the scene.

Diagnosis.—This disorder is readily distinguished from typhus, by attention to the history of the case, and espetially by the absence, during the first stage, of the nervous symptoms which always accompany the accession of the latter disease.

Pathology.—In almost all the cases which came under our observation, there seemed to be an inflammatory action of variable intensity in the mucous membrane of the small intestines, superadded to malarious fever. In many cases, the patient had suffered from a sort of muco-enteritis, for a longer or shorter space of time, previous to the accession of malarious fever. Badly-managed cases of climate fever with the gastro-enteric complication were apt to bring about a typhoid state of the economy, or to assume a typhoid aspect. The reason of this is not difficult to be understood.

Treatment.—We endeavoured to effect the cure of the local lesion, at the same time avoiding whatever might diminish the patient's strength. We sought to accomplish this principally by the application of poultices and counter-irritants to the abdomen. Sinapisms often repeated, and blisters, were used with manifest advantage. Warm poultices containing a liberal quantity of oil of turpentine, kept on the abdomen for some time, seemed to do good in some bad cases that came under our observation. At the same time we administered, internally, mucilage of gum Arabic, combined with an alkali such as the carbonate or bicarbonate of soda, if the stools were bright yellow in colour or acrid in quality, which was nearly always the case. If the biliary secretion seemed deficient, we generally gave a few grains of blue mass, unless the remedy was manifestly contraindicated. To produce sleep at night, we resorted to tepid spongings of the body, bathing the temples and head, and the internal use of morphine or Dover's powder. Larger or even full doses of these narcotics were rarely required. We also used them in small doses with benefit, for the purpose of diminishing the quantity of the evacuations when excessive. At the same time, we endeavoured to support the patient's strength by a diet as bland as possible, consisting principally of arrowroot carefully prepared, with the addition, in some cases, of chicken broth. Owing to the poor quality of the beef on the Isthmus, we could not obtain beef-tea suitable for our patients.

Under this simple plan of treatment, marked improvement generally took place. The tongue became moist, the skin cooler, the pulse less frequent, the intellect clearer, the secretions more abundant, and the belly less swelled and tender.

As soon as a well-marked remission occurred, we usually administered quinine freely for the purpose of arresting the paroxysmal fever, combining the antiperiodic agent with a little Dover's powder or powdered opium, if the bowels continued to be very loose or irritable.

The convalescence was generally protracted, and during its continuance it was necessary for the patient to be very cautious with regard to both the quantity and quality of his diet. Irritating kinds of food taken too soon, or in too free a quantity, were exceedingly apt to occasion a relapse, or to produce troublesome diarrhœa. Indeed, a disposition to looseness of the bowels remained in some cases for a considerable length of time after recovery.

Entertaining the views concerning the pathology of the typhoid stage of the climate fever which have already been mentioned, we did not see the propriety of administering alcoholic stimulants in a single case. They seemed to us likely to add fuel to the flames already kindled, and therefore much more likely to injure than to benefit the patient. Without their use, we have seen apparently most desperate cases recover under the simple plan of treatment just described.

IV. OF INTERMITTENT FEVER.

This disorder does not claim a lengthened notice in this connection. Except the remittent, it was the most common form of fever among Americans and Europeans on the Isthmus. According to our observations, its most common types were the quotidian and tertian, but the quartan was by no means unfrequent. We also saw a considerable number of cases in which the double tertian, and a smaller number in which the double quartan type was present. Besides these, many cases came under our notice, in which the cold stage was either entirely absent or but partially developed, cases in which the hot and sweating stages alone were distinctly exhibited. This form of intermittent fever seemed to be the connecting link between fever and ague and remittent fever, and on this account it is again mentioned in this place.

We also observed that the paroxysms, after having been arrested, shewed a strong tendency to return on the seventh, fourteenth, and twenty-first days after such arrest, and we turned this fact to a practical account, by supplying our patients with quinine, to be taken for the purpose of preventing such a recurrence of the paroxysms. In some cases, the chills returned at irregular intervals, which was probably occasioned by accidental circumstances. These remarks are almost equally applicable to the recurrence of the remittent from of fever on the Isthmus.

In the treatment, we made a liberal use of laxatives and quinine. Purgatives, particularly irritating purgatives, were seldom administered by us. They seemed to be in nowise necessary, and, in some cases, might be productive of much injury.

We have stated that the results of the treatment of the diseases of the Isthmus of Panama were favourable, as far as our observations extended. What were those results ? every reader will ask. The hospital record, to which we have so frequently referred, affords a satisfactory answer.

Of the 382 patients, 8 died of the following diseases, viz. :—

Tuberculosis of the Lungs and Climate Fever,	1
Climate Fever and *Delirium Tremens*,	1
Climate Fever and Enteritis,	2
Debility consequent upon Congestive Fever,	0
Erysipelas and Dysentery,	1
Chronic Dysentery and Splenitis,	1
Congestive Fever, Enteritis, and Dysentery,	1
Congestive Fever occurring during Convalescence,	0
From Dysentery,	1
Total,	—8

In the preceding pages, we have not endeavoured to present a systematic treatise upon the fevers of the Isthmus of Panama, but to record, in an intelligible manner, some of the results of personal observation in a new and extensive field.

The length to which this paper has already been extended, makes it necessary to reserve our account of Dysentery, Diarrhœa, Hypertrophy of the Spleen, &c., for a future article.

ART. VIII.—*On the Injurious Effects arising from the Manufacture of Lucifer-Matches, as observed in the Neighbourhood of Manchester.*

By JAMES BOWER HARRISON, M.R.C.S.E., formerly Surgeon to the Ardwick and Ancoats Dispensary, &c.

INTRODUCTORY REMARKS.

[In the sixty-sixth volume of this Journal, July 1846, there was given a short account of a form of Nekrosis affecting the maxillary and the jaw bones in persons employed in the manufacture of lucifer-matches. The disease had been first described, if not observed, in 1844, by Mr Lorinser, surgeon to one of the civil hospitals in Vienna ; and its occurrence is ascribed to the poisonous action of the vapours of phosphorus. It took place chiefly among females varying from nineteen to forty years of age ; and at the different manufactories at Vienna at that time, nine well-marked cases had been furnished.

In five of these cases the disease was seated in the upper jaw; in the remaining four it attacked the lower jaw. Of these nine cases five died, one was cured, and three were at the time of the account published by Professor Heyfelder of Erlangen, in 1845, in a state of convalescence.

Heyfelder, to whom we are indebted for these facts, states that the disease has been also observed among the workers in the lucifer-match manufactories at Nuremberg. Nine cases were furnished by one manufactory alone. The patients were females from fifteen to twenty-seven years of age, some married, others unmarried. All had previously enjoyed good health, and they had spent about fifteen hours daily in the manufacture of phosphorous matches. In four of these nine cases the disease attacked the upper jaw, and in the remaining five it attacked the lower jaw. Only two persons recovered; one after the spontaneous separation of the alveolar portion of the upper jaw; the other after having the lower jaw removed by operation. Six persons of the nine died; and in two of these the lower jaw was removed by operation.[1]

At this period Professor Heyfelder published a good example of the disease, which it may be proper here shortly to reproduce.

On the 7th of June 1843, Margaret Rumpler, aged twenty-one years, came into the clinical surgical establishment of Erlangen, in order to be treated for a disease of the lower jaw. For several years she had acted in a manufactory of lucifer matches as overseer of the workwomen engaged in dipping the matches in phosphorus and drying them. At first she was attacked in the teeth with severe pain, which was afterwards communicated to the lower jaw. Several teeth had become loose, and had been removed.

Upon admission the left side of the face was swelled and undermined by sanious fetid purulent matter. There were several openings by which it was possible to touch the lower maxillary bone, which was entirely denuded of soft parts. The teeth were gone, and the *alveoli* were no longer covered by the gums. The matter which flowed from the sinuses was sanious and fetid; salivation was greatly increased; the appetite was feeble, digestion bad, the pulse quick. The complexion was of a straw-yellow colour.

At the age of eighteen years, this girl had suffered from rheumatic disorders. But she had never laboured under any symptoms of syphilitic disease. Menstruation had always been regular.

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[1] Edinburgh Medical and Surgical Journal, volume sixty-sixth, p. 254. Edinburgh, July 1846; and Archives Generales de Medecine, Tome lxix. Octobre 1845, p. 204.

On the ninth of June 1843, Professor Heyfelder removed the diseased half of the maxillary bone at the articulation. The cure proceeded so speedily that the patient left the hospital on the 22d of June. Immediately afterwards she returned to her former occupation, namely, the inspection of the workwomen occupied in drying the matches after being dipped in phosphorus. At this, however, she remained only a short time; for in the month of March 1844, she returned to the hospital in a deplorable state. Not only the other half of the lower jaw, but the superior maxillary bone of the right side was attacked by the disease, for which nine months previously she had solicited assistance.

It was in the month of January 1844, that she perceived the first symptoms of this second attack. Notwithstanding this she continued to attend to her occupations until the 13th of March. At this period she was so severely afflicted, that she was unable to maintain the erect position or to work. She was kept in the hospital for two months, during which baths and poultices were administered, iodide of potassium was given, and subsequently cod-liver oil, and the decoction of Zittmann, without quicksilver, were employed; but all without the smallest degree of benefit. Being unwilling to subject herself to a second operation for the removal of the other half of the lower jaw, and the superior maxillary bone, she preferred to return home, where she died.

Upon inspecting the body, tubercular excavations were found in both lungs; and the maxillary bones and frontal bone were in a state of nekrosis.

A minute description of the condition of both jaws is given in the treatise of Drs Von Bibra and Geist, to be immediately mentioned. But it is sufficient to notice briefly the following circumstances.

The portion of the inferior maxillary bone which had been removed, presented several peculiarities. The alveolar portion of the bone was neckrosed as far as the last molar tooth, which had not yet come completely out of its socket. The other teeth were wanting. Excepting the two processes, the two surfaces of this bone were covered by a new layer of bony matter. On the anterior surface this bony layer presents a greyish porous aspect; and several openings variable in size, by which the probe may be passed to the interior of the bone.[1]

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[1] Archives Generales de Medecine, Tome lxix. Octobre 1845.

At a subsequent period, Professor HEYFELDER had occasion to examine the other half of the jaw-bone of this young woman, and found it to present the same alterations.

Professor HEYFELDER subsequently published, in the Quarterly Journal of ROSER and WUNDERLICH for 1845, two cases treated by himself, and Professor Dietz in Nuremberg. At the twenty-third meeting of the Association of Cultivators of Natural Science, held at Nuremberg, he read an Essay on the Lesions of the Jaw-Bones, and thereby gave rise to an animated discussion upon the Pathology and the Etiology of this subject.

On the last day of this meeting at Nuremberg, it happened that a patient died under this disease of the jaw; and Professor HEYFELDER availed himself of this occurrence to make some further observations, chiefly anatomico-patholigical, which were published in the Medicinischen Zeitung of the Association for Medicine in Prussia for 1845, No. 45.

Subsequently to these contributions by LORINSER and HEYFELDER, not a few observers have communicated either cases or general observations. Of these the principal are the following.

Dr W. NEUMANN, Practical Physician in Berlin, upon the Nekrosis of the Jaw-Bones of the Phosphorous match makers. Medicinische Zeitung des Vereins für Heilkunde in Preussen. Jahrgang xv. 1846, No. 28, 30, and 31. With details of Eight examples of the Disease.

HUBBAUER, Surgeon of the First Division at Ludwigsburg, in the Medicinischen Correspondenz-blatt des Wurtemberger Arztlichen Vereins, Band xv. Jahrgang 1845, No. 36. Upon two cases of Nekrosis of the Upper Jaw, from Phosphorous Vapours; and Regimental Surgeon Dr HAIMERDINGER upon a third case.

PLUSKAL, Ch. M. in Lomnitz, in the Austrian Medicinischen Wochenschrift, Jahrgang 1846, No. 30, relates a case of Nekrosis of the Lower Jaw observed in a child, which had arisen from frequent lighting of many Lucifer Matches.

RODER, apothecary in Lenzburg, Kanton Aargau, made in June 1846 a proposition for preserving the workers in Lucifer Match Manufactories from becoming attacked by disease. DINGLER'S Polytechnisches Journal. Jahrgang 1846. Erstes Juni Heft.

Dr LORENZ GEIST, of whose labours we shall immediately speak more fully, made known in 1846, in a small Article published in the Medical Correspondence Sheet of Bavarian Physicians for that year, two cases of disease of the Jaw observed by him, and endeavoured therein to prove that the original seat of the disease must be sought in the periosteum.[1]

Little doubt can be entertained, from the phenomena, cause, and effects of the disease, that this idea is perfectly well founded, so far as relates to the disease in the bones of the face.

These were all the writings on the subject which had been made public by the physicians of Germany up to the year 1847.

By the physicians of France the following writings were communicated to the profession.

STROHL, Assistant to the Faculty of Medicine; Note on a peculiar form of Nekrosis of the Maxillary Bones, produced in the Manufactories of Lucifer Matches; read to the Society of Medicine on the 7th August 1845. Gazette Medicale de Strasbourg, fifth year, Nos. 11, 20, November 1845.

SEDILLOT; Comptes Rendus des Seances de l'Academie Royale de Science de Paris, Marz 1846; reports three instances of Nekrosis of the Upper Jaw. Noticed in Neumeister's Neues Repertorium, Jahrgang 1846; Chirurgie, No. 8.

BRICHETEAU, in Paris, gives, in a letter to the Editor of the Journal de Medicine, fourth year, Marz 1846, Notices upon the Increase of Diseases of the Jaws.

ROUSSELL, Th.; Researches upon the Diseases of the Workmen employed in the Manufacture of Lucifer Matches, &c. Memoire presenté a l'Academie des Sciences, le 16 Fevrier 1846.

DUPASQUIER, M. Alphonse; Professor of Chemistry at the School of Medicine at Lyons, former Physician to the Hotel Dieu, &c.; On Phosphoretted Vapours, and their effects upon the Workmen employed in the Manufactories of Phosphorus, and the Workshops in which Chemical (Lucifer) Matches are prepared. Memoir presented to the Academy of Sciences; Meeting of 31st August 1846. Gazette Medicale de Paris, 1846, No 49.

All the observers above mentioned directed their attention particularly to the lesion in the bones of the upper and lower jaws. GENDRIN, alone, in Paris, had occasion, after ROUSSELL, to observe in the workers at the lucifer-match manufactories an inflammatory disorder of the bronchial mucous membrane, shewing itself by peculiar symptoms; and DUPASQUIER is the only person who, keeping in view, in a particular matter, the etiological agents, believes that this is to be found not in the phosphorus or its vapour, but in the arsenic with which the former is often adulterated. It will be seen that the first-mentioned proposition, that relating to the affection of the bronchial membrane, and it may be added in certain cases, the lungs, have received, as full confirmation as is necessary to shew that it is well founded. The second proposition may be considered as still in a state of probation.

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[1] Medicinischen Correspondenz-blatt Bayerischer Aerzte. Jahrgang 1846. Nos. 13-17.

This disease seems to consist in or to depend upon the action of the phosporetted vapours upon the bones of the upper and lower jaw, and their periosteum. Fatal cases are said to exhibit symptoms of pulmonary consumption.

In the year 1847, Drs Ernest Von Bibra, and Lorenz Geist published at Erlangen an express treatise on the diseases of the workers in the lucifer-match manufactories. Of this work, which contains full and detailed accounts of the disease, its origin, its symptoms, and its effects, with profitable suggestions for its prevention, it has been our intention to give some account. Various circumstances, however, have concurred to prevent us from doing so.[1] At present we can only advert to some of its most important contents.

Notwithstanding the list above given, Dr Lorenz Geist thinks that the number of observers of this disorder is still small; and he remarks, that, in France especially, the lesion of the lower jaw has been seldom seen, and consequently has been little the subject of investigation. Assuredly, if we consider the great number of lucifer-match manufactories in Paris, and the populous and industrious cities and towns of France, it must be allowed that much less, comparatively, has been done to make known and elucidate the disease of the lucifer-match makers in France than in Germany. It is particularly in Vienna, Berlin, and Nuremberg, that most of the cases have been witnessed, and their effects recorded. It is principally upon morbid specimens of the diseased parts derived from these cities, that the microscopical and chemical inquiries of Von Bibra have been made. This physician has examined, in the manner now specified, seven lower jaws and three upper jaws, which had been the seat of the lucifer-match disease.

It is not, however, either by microscopical inspection or by chemical analysis, that the characteristic nature of diseases is in all instances elucidated. Observation of symptoms during life, and examination of the state of parts when life has ceased, are, if not always, at least in the greater part of diseases, necessary to enable the physician to understand, and instructively to explain to others, the nature of the morbid action; while attentive and sedulous observation of the circumstances in which diseases arise, is quite indispensable, in order to form just ideas of the peculiar causes on which they depend. The accomplishment of a plan of this kind, says Dr Lorenz Geist, demanded the combined efforts of the physiologist and the physician, and the result of the connection of the two is the work of Dr Von Bibra and his associate.

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[1] Die Krankheiten der Arbeiter in den Phosphorzündholtzfabriken insbesondere das Leiden der Kiefer Knocken durch Phosphordampfe Bearbeitet. Von Dr Freiherrn Ernest Von Bibra, und Dr Lorenz Geist. Erlangen, 1847. 8vo.

Among other inquiries, Dr Von Bibra undertook to ascertain the mode in which phosphorous vapours operate upon the lower animals. One of the results of this inquiry seemed to be, that the disease does not consist in a simple necrotic process, though the lesion was in its commencement periosteal inflammation. This, he thinks, is proved by the peculiar phenomena which manifested their presence in the animals exposed to phosphorous vapours, not only in the bones, but also in the soft parts, as well as the necroscopic appearances found in the bodies of the workwomen, cut off after the acute form of the disease.

The diseases, to which the workers in lucifer-match manufactories are exposed, may be distinguished, according to the best observations hitherto made, into two principal tribes.

These are,

I. An Inflammatory Affection of the Mucous Membrane of the Lungs; *Bronchitis*, and habitual Cough; Gastric symptoms.

II. A Peculiar Disease of the Jaw-Bones, not hitherto determined in its nature; both tending, in all cases hitherto observed, to Nekrosis.

I. The inflammatory disorder of the Bronchial Membrane has been described principally by the physicians of France.

Since the origin of lucifer-match manufactories, from time to time there have been received from these establishments, workers, mostly females, who were employed in the business of dipping the wood matches in the mass of phosphorus. Among the patients, also, were males, whose duty consists in rubbing the combustible substances. All these patients agree in making the statement, that, from the date at which they entered the manufactory, they were attacked by cough. They then in general first applied to the hospital for assistance, when the cough had become habitual, was aggravated and complicated with all the symptoms of acute Bronchitis. The Bronchitis differs not in its essence from that which

These forty-nine cases were the whole known in Germany in 1847. Three took place in Strasburg, making fifty-two cases. All the Vienna, Nuremberg, and Berlin cases took place in females. Two of the Ludwigsburg and Lomnitz cases occurred in men. Six other cases were afterwards observed by Drs Von Bibra and Geist; and one case was communicated to them by Dr Kolbe of Stuttgart. All these six cases took place in females between the ages of sixteen and twenty-three. The case of Dr Kolbe occurred in a woman of thirty three.

Among the whole sixty-eight cases only five took place in men. It might be inferred from this that males were less liable to be affected. This conclusion, however, would be far from being correct. The small number of males attacked depends upon the small number of men employed in these manufactories. The greater part of the operations are performed by females. And if the number of men attacked be compared with the number of men employed, the proportion will appear, Dr Geist is persuaded, not materially different. He thinks, therefore, that it is a legitimate inference to say that the disease spares neither sex nor age. We further find, that of these sixty-eight cases, fifteen persons recovered, fifteen died, fifteen were under treatment; and of twenty-three cases the issue is not known. Of the fifteen cases of recovery, those which took place at Berlin are distinguished by a large proportion of success, in so far as among eight instances of the disease seven recovered.

Among fifty-four instances there were twenty-three of disease of the upper jaw, twenty-six of the lower jaw, and five instances in which both jaws were affected.

These numbers shew a very slight predominance in favour of the lower jaw.

We would with great pleasure give more ample details from this elaborate and instructive work. But this our limits and present object forbid. It is sufficient at present to direct attention to the only complete treatise that has yet appeared on this subject, in connection with the essay by Mr Harrison. We shall, however, endeavour to find opportunity to place before our readers some of those results which the researches of Drs Von Bibra and Geist have furnished.

Meanwhile it may be at once interesting and instructive to direct attention to the observations of Mr Bower Harrison on the same disease as it is seen in Manchester, and the observations on it as it appears in the workers in two lucifer-match manufactories in Dublin.]

As the manufacture of lucifer matches is a comparatively new branch of trade, it is important that its effects upon artisans should be properly understood, and every means afforded them of protecting their health and their lives. It will be found, that when the trade is practised *under disadvantageous circumstances*, the most formidable and appalling evils arise from it. An affection ensues, which is so insidious in its nature, that it is at first supposed to be a common toothache, and a most serious disease of the jaw is induced before the patient is fully aware of his condition. This disease gradually creeps on until the sufferer becomes a miserable and loathsome object, spending the best period of his life in the wards of a public hospital, and these evils are incurred for a remuneration as small as that of six or eight shillings per week. It will be seen that most persons quit the employment before the disease has proceeded far, so that the employers are not always aware of the extent of the mischief. Many patients have died from the disease; many, unable to open their jaws, have lingered with *carious* and *necrosed* bones; others have suffered dreadful mutilations from surgical operations, considering themselves happy to escape with the loss of the greater portion of the lower jaw. That such results call for the investigation of the surgeon, there can be no doubt, and it equally becomes the duty of society to give a proper consideration to the information which is afforded.

My attention was first directed to this subject during a visit which I paid to the Manchester Infirmary, where I saw a young female suffering from the complaint. She would have been good-looking if it had not been for the foul disease of the jaw. I was told at the hospital, that fourteen patients could be enumerated, who, in the space of a few years, had been admitted with the same disease, and, I believe, from the same manufactory. I do not imagine that the evils which attend the manufacture of lucifer-matches are commonly known, and I am very sure that it is necessary they should be so. I think it would be well if the manufactories in which the trade is carried on were subjected to suitable inspection and stringent regulations. How great is the importance of the ventilation of these places will, I think, appear in the sequel. I trust, however, that the results which I am about to describe are those of exceptional cases; but it is still proper that such exceptions should be known. I do not wish to censure those engaged in the trade. Some, I am aware, who had entered upon it without a full knowledge of its consequences, are now seeking to ameliorate the condition of their work-people. I wish rather to make it apparent that these matters should not be left to the knowledge or benevolence of individual manufacturers; for who can say how many ignorant persons may yet embark in the trade? Who can say how many persons of limited capital may commence the manufacture in small and ill-ventilated chambers. The soldier is not forgotten by a grateful country, and shall the sons and daughters of industry perish ignominiously by the labour of their own hands?

When I thought of inquiring into the extent of the mischief which resulted from the manufacture of lucifer-matches in this neighbourhood, I obtained some particulars from patients who had been formerly treated in the Manchester Infirmary. As most of the sufferers had, however, been removed to their own homes at some little distance from the town, I could not readily collect all the information I desired, particularly as the weather was extremely wet at the time, and I became unexpectedly engaged with other important occupations. I am happy to say that the operatives with whom I obtained an interview made no reproachful allusions to the nature of the employment, and spoke in a modest and resigned manner, that would have done credit to the most educated of men. I have given the statements of the patients, without any pretensions to offering full details of their cases, and much in the way that the evidence of a witness might be recorded; the repetitions which occur have been purposely suffered to remain, and I have confined myself chiefly to such remarks as appear to elucidate the effects of the employment. It was my original intention to have spoken of all the fourteen cases, but the few I have given may, in the present instance, be sufficient.

CASE I.—Anne MacVie, aged 20, was occupied four years before she suffered from her employment. Her teeth were previously good; her complaint began like ordinary toothache, and was considered by her as such in the commencement. She was occupied only in putting the lids on the boxes. At first she could perceive the smell of the preparation, but afterwards she became insensible to it; she stated that her clothes, as well as her hands and arms, were incandescent at night; she had enjoyed good health previously to being engaged in the occupation, and had been employed in a silk factory. She had not taken her meals in the lucifer-match factory, and had always been in the habit of washing her hands, and attending to personal cleanliness. When she uncovered her face I perceived that the lower jaw was nearly deficient, and at the side of the jaw were two or three large holes. Mr Jordan had removed the jaw, at the Manchester Infirmary, about seven years ago (January 1852). She is now occupied in putting labels on boxes; her wages had been six shillings per week. She is of a pale and scrofulous-looking appearance; she had been accustomed to have meat daily, at least as much as her wages would admit of. She said that she had no gathering about the tooth in which the disease began, but that the complaint was at first like common toothache; she resides in the Droylsden Road, Newton Heath. She says that many of the work-people take their meals in the work-rooms.

(The matches made are of wood. The dippers dip the matches in bundles into the preparation contained in iron bowls, and they are afterwards spread out to dry.)

She was seven months in the Infirmary; altogether her appearance is a sad spectacle. She had no salivation previously to the disease of the jaw, but afterwards a profuse one; she cannot now chew anything that is not quite soft. Says she works at what the people term "*piece work*," that is, she obtains remuneration according to what she does, it being sometimes six, sometimes seven, and sometimes eight shillings per week.

CASE II.—Margaret Burns, resides at Newton Heath, next to MrWoolstencraft's timber-yard; aged 23; employed about two or three years previously to her suffering from the occupation. Her department was that of picking (sorting) the matches previously to their being put into boxes after they were dipped. She had good teeth before entering on this business; the complaint began like ordinary toothache, for which she had one tooth extracted; but the gum afterwards gathered and discharged outside. She could at first smell the peculiar fumes, but not after a time; she had good health before she entered the employment; she did not take her meals in the work-place, but at home, as she did not live far off. It is now (January 1852) four years since she was affected; she had not been in any occupation before entering the factory; she always washed her hands before her meals, and was attentive to cleanliness. She had heard something of the injurious nature of the work before she commenced it, but conceived that the reports were exaggerated, and that she should escape. She obtained from seven to eight or ten shillings per week, according to what she did; she states that formerly the business was carried on in two rooms, but that now they were thrown together, and all worked in the same room, which did not smell so bad as each did formerly. She is not of a scrofulous appearance, and would be good-looking if it were not for her complaint.

The lower part of the face is much altered by the loss of the greater portion of the jaw, which gives a peculiar cast to the countenance, the natural oval of the face being destroyed. She had been in the habit of getting meat daily, and had previously, and now has, good health, irrespective of the state of the jaw. She was taken to the workhouse after the appearance of the complaint, where she was under the care of the resident surgeon for one year and a half. She said she underwent three operations at the workhouse; she was subsequently four months in the Manchester Infirmary, where she says Mr Jordan performed two operations. She was not subject to cough, and suffered in no other way than from the jaw; but she states that some persons in the occupation suffered from coughs, but she believed them to be naturally subject to such affections; her appetite was not affected by the employment. The lower jaw seemed nearly all absent, and presented a shocking and revolting appearance; even at the present time (January 1852) it is not properly healed; she had no salivation before the jaw became diseased, but afterwards a profuse one; she is obliged to live on soft food, and cannot chew anything not previously crushed and made soft. She is now employed in making boxes, and is out of the way of the fumes; for her present occupation she obtains about six shillings a week. The disease commenced in a tooth at the right side, and gum abscesses formed about it. This girl, like the other, is, as regards appearance and comfort, quite ruined for life; she said that she suffered so much that she often wished to destroy herself.

Case III.—Joseph Johnson, aged 21. His face looked swollen and distorted, and on one side was the mark of a deep, round ulcer; he had worked six years in the occupation before he began to suffer, the complaint then came on like toothache; he does not believe he had any decayed teeth prior to his entering the occupation. He was a *dipper*, and held his face over the heated preparation; he worked from 6 in the morning until half-past 7, dipping all the while; had good health previously. When the disease commenced he came to the Infirmary at Manchester; he has now no teeth in the lower jaw, which is in a great measure destroyed; he did not take his meals in the place. He obtained fourteen shillings per week for what he called *piece-work*, that is, he was paid in proportion to what he did. He mixed the preparation as well as dipped the matches. He says that the preparation is composed of phosphorus, chlorate of potash, and glue, the matches being previously dipped in sulphur; the matches are of wood. He says that he was particular in washing himself, &c.; that he did not know of the injurious effects previously to his entering the manufactory; says that he stood all day, except at meal times, *i. e.*, from 6 A. M. to 7

P. M.: he lived near the establishment, and could smell the fumes even out of the building when the wind blew in a favourable direction; during all the period of his occupation he could smell the odour of the preparation; his clothes became incandescent with it; and the rooms in places looked like white smoke; he had a good appetite whilst in the occupation, and was well in all other respects, not having cough, &c. Says he knows of fourteen who have suffered from the work, all residing at Newton Heath, and that two died. He had pains in his knees from long standing, and the knees became in some measure crooked with it; he is well now, but cannot chew anything hard; he works at present in making cases for packing up, for which he obtains 8s. 6d. per week; he works from 6 A. M. to half-past 7 P. M.; he had salivation after the disease set in, but not before it; he cannot say that his taste was affected, or that he perceived the phosphorus in his mouth. Does not think the place is damp; none of the people made any reflection on the master.

CASE IV.—Anne Farrell, aged 19, at present in the Manchester Infirmary with diseased jaw. This young woman said she got remunerated according to the work she did, which did not bring more than seven or eight shillings per week; that she was engaged in separating the matches; that she was not aware of having any decayed teeth when she went to the works, but that the complaint commenced like toothache; afterwards the gum swelled by the side of the tooth, gathered, and burst; a discharge took place; the swelling then re-formed and again burst; that her face was not swelled when she left the establishment, but she left from her knowledge of what had happened to others. This was her first place of occupation; she had not previously been in any employment; she had not perceived any peculiar bad taste or odour, but this she attributed to being accustomed to the rooms; said that formerly the rooms were very close, but that they had been lately altered so that two rooms were thrown into one; she stated that her clothes were incandescent at night; said that young men were employed in the dipping department, but that no women were employed in it; several of the former, however, had suffered.

CASE V.—Bridget Ryan, aged 15, also in the Infirmary, with diseased jaw; formerly worked in a cotton manufactory; has been three months in the Infirmary, and had been ill four months before. The rooms were formerly close, but have lately been altered; she did not make more than six shillings per week; she had a toothache when she left; had not any decayed teeth before she went. Her occupation was to put the matches in the boxes; had been employed three years before her jaw became diseased. She says the rooms look incandescent when the gas is put out, and that her arms and dress were so whilst she was employed. I asked whether any precautions were taken to prevent mischief to the operatives. Thinking I was referring to precautions against fires, she stated in reply that the matches frequently took fire. When she got accustomed to the work, she did not perceive any particular taste or smell. She stated that several young men had suffered from the dipping department, in which young men were exclusively employed.

I was told that two persons had died from the occupation, one, J. D., aged 24, who was the nephew of the gentleman who kept the establishment. He had been in the Infirmary, but was discharged as incurable, and died at home. He had been employed as a dipper. Another, William Reynolds, also died at his own house, was never brought to the hospital, but was under the care of Mr Pegge ; he had been employed three or four years, and was about eleven years of age ; he was employed as a lapper-up.

In the establishment in which these cases occurred it seems that the work people stand during the whole day, except at meal-times, and many suffer from the state of the knees. The floor is partly of brick and partly of flag. Efforts have been made, and are still being made, to prevent the fumes from being perceptible, and the place is, in this respect, now much improved. The dippers are generally lads. The hours are from six in the morning until seven at night, with the exception of half-an-hour for breakfast, one hour for dinner, and half-an-hour for tea : all have the same hours. There were formerly two rooms, but they are now both thrown into one.

The period necessary for the production of the disease must obviously depend on various causes, particularly on the constitution of the employed, as to whether it is scrofulous or otherwise ; something also will depend on the condition of the teeth, whether carious or sound ; also on habits of cleanliness ; and the department in which the person is engaged. It will be seen, however, to range generally from two to six or eight years ; but in some cases mischief did not arise before eleven or more, so that immunity for a considerable period should not render us certain that no danger is to be apprehended. I collect the following on this point from some of the medical periodicals. Dr Strohl[1] mentions several cases which occurred after various periods. The first case, which was fatal, happened in a female, it is stated after *many years'* employment.

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[1] American Journal of Medicine, 1849.

The second also in a female, aged 24, who was a dipper; the disease came on after five years of occupation, and commenced *three months after she had left,* when eight teeth became rapidly carious; the upper jaw became diseased as well as the lower, and the matter (pus) had the odour of phosphorus.

The third case, a female of 22, occurred after two years' employment; her health had continued good until the last two months of her employment; the gums then began to soften and swell, violent pains came on in the teeth of the upper jaw, the teeth became *carious* and fell out; a fetid suppuration arose, and the bone became extensively diseased.

The next case was likewise in a young woman of 22. Her department was to make up parcels, but *this was done in the same room where the matches were dipped;* at first she experienced a defluxion from the nose; after three years the face began to swell, and she left the business; the upper jaw became carious after the formation of an abscess.

M. Sedillot, of Strasburg, relates three cases which came on after about four years, all females. One died.

In the manufactories at Vienna, cases did not occur until the employment had been pursued for eleven years.

In Mr Taylor's cases,[1] the first patient, a man of 49, had been engaged eight years; the complaint commenced with pain in the upper jaw, and purulent discharge. The second, a man of 45, had been fifteen or sixteen years in the employment; he was a kind of superintending assistant, and had the credit of being the first who introduced the trade into England; he was of intemperate habits.

Dr Ebel has furnished an account of the result of five years' experience in the factory at Waldmichelberg, as well as a digest of what had been previously written on the subject. It would seem that the factory where his observations were made was under peculiarly good management, and, in all probability, the ventilation was very perfect. There were about 200 individuals employed there, both male and female, chiefly between fourteen and eighteen years of age. The hours of occupation were from 5 to 7, two being allowed for meals, the meals not being taken in the work-place. Attention is also paid to the health of those admitted into the establishment previously to their being engaged. There is less wonder, therefore, that the place is stated to be free from disease. It appears that caries of the teeth is common in the neighbourhood, but not more common in the establishment than elsewhere. Out of 200 persons, 153 had some carious teeth. Dr Ebel states that the health of the persons in the factory was on the whole better than that of those who were in a similar rank of life out of the employment, and that, after a few years, an improvement was remarked in their condition. The work, he says, is not laborious, and the rooms in which it is conducted are spacious. It is incidentally remarked that some of the diseases of the locality, especially the itch, became less prevalent since the establishment of the factory, a result which may very likely arise from the sulphurous fumes. On the whole, this report is very favourable; but perhaps it is a little premature; for the proprietor does not seem to have had more than eleven years' experience. It shews, however, how much may be done by a good system of ventilation and cleanliness, with spacious rooms.[1]

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[1] Lancet, vol. ii., 1849.

In concluding these observations it may be interesting to notice briefly some of the suggestions which have been made for the prevention of these injurious effects.

Mr Henry Taylor, of Nottingham, suggests that a mask be worn over the face of the dipper, with a tube to pass out of the building into the open air, provided with valves for exhaling and inhaling, like those attached to the chloroform inhalers.[2]

In a report of an operation performed by Mr Stanley of St Bartholomew's Hospital,[3] the writer says: "The painful feelings excited by the sight of this new victim of our vaunted improvements in various branches of manufacture were greatly mitigated by the announcement Mr Stanley subsequently made, regarding the *prophylaxis* of these dreadful affections. Workmen in lucifer-match manufactories have now a chance of escaping the baneful effects of the evolution of phosphorous acid, by placing saucers filled with oil of turpentine about their work-rooms; as the oil of turpentine is a solvent of phosphorus, it is expected that it will absorb the vapours which cause so much mischief. This precaution is taken at a large lucifer-match manufactory in the neighbourhood of the London Hospital, and the very best results are expected from it."

Dr Baur proposes the use of alkaline fluids in addition to other means.[4]

"The preventative means would consist in the following precautions.

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[1] Casper's Wochenschrift, 1851, Nos. 10 and 11.

[2] Lancet, Nov. 10, 1849, p. 498. [3] Lancet, Nov. 17, 1849, p. 429.

[4] Nouvelle Encyclographie, Aout 1850, p. 219.

"1. In preventing the phosphorated vapours from acting on the teeth by the use of a mask, or still more effectually by means of a handkerchief to which is attached a sponge soaked in water, or in an alkaline liquor, soda, or potash. By this contrivance these vapours would be prevented from reaching the nose and the mouth of the workmen.

"2. In the manufactories or workshops, it might be easy to have flat vessels filled with an alkaline lee, which would attract the phosphorated vapours.

"3. If the individuals who work at this species of labour, have stumps or hollow teeth, it would be requisite to have recourse to a dental stopping which might fill these cavities. At the same time it should be recommended to all the workmen to take great care of their teeth, to clean them frequently, as well as the face, with a calcareous or lime water liniment. This consists of lime water thirty grammes, oil of white poppy fifteen grammes."

It is possible that the use of alkaline remedies may be of some service. But I think more is to be trusted to ventilation, to the proper construction of the rooms, to a perfect separation of departments, to an abridgment of the hours of labour, and the choice of workmen and women who are not of scrofulous constitutions, and who have not decayed teeth. The habits of the work-people ought also to be carefully attended to, and no one should be allowed to take meals in the work-place. It is not unlikely also that the more injurious parts of the occupation might be rendered innocuous by mechanical contrivances which should supersede the dipping of the matches by men stooping over the fumes of melted phosphorus. But these means require not merely being known, but being enforced; and it is to contribute to such a result that I have been induced to offer the foregoing remarks.

But let me return from these details to the consideration that the poor persons whose cases I have named are still suffering from their affliction; that there are yet patients in the wards of the hospitals, who are lingering day and night with this slow and disgusting disease. Young women who were once good-looking are shut out from the prospects which marriage might have afforded, and young men who were once buoyant in health have broken their strength and spirits in struggling with a horrible disorder. Who shall take up their cause if every right-minded man does not feel it to be his own? Who shall commiserate such misfortune, if every kind-hearted woman does not remember that there is no social position so elevated as to be freed from the obligations which charity imposes; and none so dignified that it is not rendered more graceful by the spirit of universal love?

APPENDIX BY THE EDITOR OF THE DUBLIN JOURNAL.

[The disease thus faithfully described by Mr Harrison is of so serious a character, its prevention of so great importance with reference to a manufacture which affords useful employment to young persons at an early age, and its history so little known to the profession, that we were anxious to ascertain if it had been witnessed in this city. We therefore personally visited the only two lucifer-match manufactories which at present exist in Dublin, those of Mr Kelly in Clarendon Street, and of Mr Reaney in Upper Abbey Street. Neither of them have been in operation for more than six months; but in the former, one of the lads employed in *dipping* was previously engaged for a year and a-half at the same work in a factory which was in Kennedy's Lane, but is now closed; and in the latter there are two lads, aged about 19, both of whom were for several years in one of the manufactories near Manchester referred to by Mr Harrison.

In Mr Kelly's establishmeut three different manufactures are carried on under the same roof, viz., the making of ink, of blacking, and of lucifer-matches; the building is large and well ventilated, and the odour af phosphorus, even in the room in which the matches are dipped and made up in boxes, is but trifling, and not in the least complained of by the boys, about twenty in number, who work there. The process of dipping differs somewhat from that described by Mr Harrison. The compound, which consists of glue, chlorate of potash, phosphorus, and a small quantity of camphor, the latter ingredient being used to neutralize the smell of the phosphorus, —which it does very effectually,—is first melted over a slow fire, and then poured on a heated stone slab, so as to form on it a layer of about the eighth of an inch in depth. The matches, previously tipped with sulphur, and fixed loosely in a wooden frame about two feet long and a foot wide, are dipped rapidly on the flag until their points are coated with the melted composition; both ends are thus dipped, the frame being quickly turned round in the hands of the dipper in order to effect this; the matches, which are thus, so to say, double, are afterwards cut across in the middle, being placed in bundles under a large cutting knife; to prevent ignition from the friction to which they are necessarily submitted while being cut, their tops, coated with the compounds, are moistened before the matches are placed under the knife. Nevertheless they constantly take fire, and much loss is thus occasioned.

The lad in this factory who had been previously engaged in Kennedy's Lane told us that about six months after he first went to the business he was attacked with toothache, but that he got the tooth extracted, and never had any pain in his jaws or teeth since; he shewed us the tooth, which he carried about with him as a memento;—it was the second molar in the lower jaw, and was affected with seemingly ordinary caries. We also examined his mouth carefully; his teeth were all sound, but they were extremely and unnaturally white, of a somewhat diaphanous aspect, and quite free from tartar or other concretion; and we may remark here that the teeth of one of the lads in Mr Reaney's factory, of whom we shall speak particularly hereafter, and who had suffered from symptoms of the malady, presented a precisely similar aspect. A man who was also engaged in dipping in Mr Kelly's, told us that he had been at the work for about three months, that at first the smell made him sick, and did so still if his stomach was empty, and that he had occasionally headache and pains in his jaws and cheek-bones, but not like toothache; his teeth were all sound: this man had evidently heard something of the disease and was apprehensive of being attacked with it. Mr Kelly informed us that the dipping was carried on in his establishment only twice a week, and then for not longer than two hours at a time. The odour of the phosphorus was, we think, much counteracted here by that arising from the vinegar and sulphuric acid employed in making the blacking and ink under the same roof, but was nevertheless very powerful immediately over the heated flag on which the compound was poured. It is right to add, that both the master and the men laid great stress, however, on the use of the camphor as a preventive.

Mr Reaney's factory is devoted solely to the making of lucifer-matches. The rooms, two in number, are large, airy, and well ventilated; about thirty boys, between the ages of six and fourteen years, two lads about nineteen years old, and three men, are constantly employed. None of them, except the two lads, have been engaged in the business for a longer period than five months; these two lads, as before remarked, were employed in one of the Manchester manufactories for seven or eight years. One of them, Hugh Regan, a lad of much intelligence and observation, gave us the following account of himself:—He was employed for more than seven years in the —— factory, near Manchester; latterly he had been engaged in dipping, being constantly at it every day in the week, and for nearly twelve hours each day, and was paid by piecework; he knew several of those who had lost their jaws in the business, and he recollected some who had died in consequence of the disease.

(We tested the correctness of his story, by asking him the names of the persons whom he had known to be affected, when, amongst others, he mentioned those given in Mr Harrison's paper).

He found his own health failing at length; two of his teeth got bad, and one of them he had extracted; the other is still in his mouth, but does not annoy him now.

(This tooth, the second molar in the lower jaw, we examined; it is worn away nearly to the level of the gum, but is not black, nor does it present any hole, and has not the usual appearance of a carious tooth).

He consequently came over to Dublin, and although he has been for the last four months engaged in this factory, he has lost all the symptoms of the disease, nor does he apprehend any return of it, as he only dips now on two days in the week, and only for two hours each day; moreover, he says, that the place is more airy, and the smell not so bad.

(No camphor is used in the compound in this factory, and the odour of the phosphorus is much more powerful than in Mr Kelly's, although the room in which the dipping is carried on is much larger).

This lad also told us, that, in England, more girls are affected with the disease than boys or men, although they are not so much exposed to the fumes of the phosphorus as the latter; and this he accounted for by a habit which he said they had of constantly picking their teeth with pins, with the idea of keeping them clean; he said that several of the girls made their teeth bleed every day by thus picking them.

The other lad had been equally long at the business, but in England he was employed in pasting the boxes together, and he followed the same occupation here, with the addition of being occasionally engaged, for a couple of hours at a time, in separating, with his fingers, the matches which adhere together at their points. This is the employment, in which those girls who are described in Mr Harrison's paper as being attacked with the disease, were chiefly engaged; but he has never had the least symptom of it, and his teeth are perfectly sound.

In Mr Reaney's factory, the method of dipping in a large bowl is precisely similar to that followed in England. In both the factories, the operatives are paid by the week, and not by piece-work; they are all in the enjoyment of robust health, and we heard no complaints of pains in the knees from fatigue, although, with the exception of about half-a-dozen boys, they all work standing. The hours of work are from seven in the morning until seven at night, two hours being allowed for meals, which are eaten at their own homes.

In conclusion, we have but little to add to the admirable suggestions contained in Mr Harrison's paper as to the prophylaxis of this afflicting disease. Our observations practically bear out the importance of proper ventilation, and from them we think may also be deduced the great advantage which would be derived from a division of labour, so that none of the employed should be exposed to the phosphorus fumes for a longer period " than two hours at a time for two days in the week," the plan followed in the Dublin manufactories.]

ART. IX.—*Upon the Theory of the Operation of the Nervus Vagus.* By C. ECKHARD, of Giessen. (Muller's Archiv fur Anatomie, Physiologie, und Wissenschaftliche Medicin, Jahrgang 1851. Heft iii., seite 205.)

Any one who calmly considers the reason which Volkmann in his Haemodynamik (page 378 ff.) adduces in favour of the hypothesis of Weber, upon the distribution of the Nervus Vagus to the Heart, can scarcely resolve to continue an adherent of the theory of Budgé and Schiff. I further think, that I can produce a new fact which speaks in favour of the hypothesis maintained by Weber, Volkmann, and Ludwig.

In my researches upon the action of chemical agents upon the muscular nerves of the Frog, I found that the solutions of most of the alkaline salts, perhaps of all of them, as the representative of which I will select, in the following remarks, common salt (chloride of sodium), present a very peculiar character. This is, that upon immersing the nerve, there arises according to the irritability of the latter, and the degree of concentration of the solution, after a longer or shorter time, first a vibratory motion in a few fasciculi of the muscles connected. The number of these vibratory motions increases successively, and soon the muscular fibres are all in action, so that not unfrequently they contribute to a general convulsive action. This irregular movement commonly lasts for a quarter of an hour and longer.

The possible theories which may be proposed upon the action of the substance now mentioned, must be developed in another place. We meanwhile see so much, that this peculiarity of convulsion must depend upon this circumstance, that the fibres of the nerve-trunk come into action successively one after the other. This is sufficient to the following conclusion. If the *Nervus Vagus* is the motific nerve of the heart, upon irritating this nerve by common salt, at first only a few muscular bundles ought to be thrown into motion; this then should increase; and, finally, an irregular objectless convulsive motion should take place, in the muscle of the heart. If it is not so, but if the normal movements of the heart depend on a central organ, situate in the heart itself, while the *vagus* has the function of conducting to the ganglia of the heart, irritations, which are by these worked in different modes, so that sometimes acceleration, sometimes retardation, sometimes cessation of the heart's action takes place; then upon the specified irritation being applied, one of these three effects, and therefore acceleration of the pulse after irritation of the *Nervus Vagus* would be rarely observed; most probably the last two would take place.

We may, therefore, by irritating the Vagi of the frog, by means of a concentrated solution of common salt, without maintaining spasms in individual bundles of the muscles of the heart, retard the pulse, and cause the action of the heart to stop.

The course of the experiment is the following.—After the experimenter has decapitated the frog, and destroyed the spinal marrow, for the sake of more easy preparation, he removes from the back the two shoulder-blades, with the anterior extremities and the breast bone, and prepares the intestinal branch of the *Nervus Vagus* immediately from the *foramen jugulare.* After he has insolated this nerve as far as possible, he cuts off on each side, a bit of bone in the immediate neighbourhood of the *foramen jugulare,* leaves it hanging; and, lastly, immerses the whole isolated portion of nerve in a concentrated solution of common salt. For the convenient application of this, I employ two standards. Each carries at its upper end a transverse arm, and the latter a wire removable in the perpendicular direction, which, by means of a screw, may be fixed at any degree of elevation. On the lower end of the latter, is cemented a small glass cup, in which the *Nervus Vagus* is to lie in the saline solution. Should the experiment be free from every objection, the operator may place a ligature upon the nerve, close to its exit from the cavity of the cranium. If both *vagi* are immersed, the heart appears at first to beat something more rapidly than normal; I can express this, nevertheless, not as established, because a slight increase produces only a small number of beats in a given time, and in general also without irritation, multiplied changes may take place. It is evident on the other hand, that a little after two minutes after that the *Nervi Vagi*, uninterrupted, have been immersed, the heart beats in a remarkable degree slower; that a little after four minutes the auricle is contracted still feebly and incompletely, and then ceases to move entirely; that after this stoppage of the auricle ensues, the ventricle still undergoes a few feeble contractions, until it also sinks to rest, and then the whole heart remains motionless in a state of expansion.

If in this condition the experimenter applies mechanical irritants to the auricle or the ventricle, complete contractions return; in the first case the auricle first contracts, then the ventricle; in the second the order is reversed. If he again takes the *vagi* out of the solution, and removes the immersed portion, or washes it with water, the heart again begins its normal actions. It is undoubtedly easy to identify with the previous the following rude experiment. If the operator places the heart of a frog cut out of the body in some drops of a solution of common salt, in such a manner that the spots, where lies the course of the cardiac branches of the *Nervi Vagi*, are immersed, the heart speedily ceases to act in the manner already described. On the other hand, if only the surface of the heart next to the inverted breast-bone is exposed to irritation, only in few instances, and at a late period, does cessation of action take place. We see that the chemical irritation of the *Nervi Vagi* has the preference above the electrical, in order that the operator may observe in it the individual portions of the heart passing after each other into quiescence. One-sided irritation of the *Vagus* produces, though in a much longer immersed portion, only retardation of the beats of the heart.

ART. X.—*Account of a peculiar Pathological Development of Tesselated Epithelium, in the Urinary Canaliculi.* By Dr F. MAZONN, of Kiev. (Muller's Archiv fur Anatomie, Physiologie, und Wissenschaftliche Medicin, Jahrgang 1851. Heft iv. Berlin, August 1851, seite 316.)

From a larger work upon the Pathological Anatomy of Bright's Disease of the Kidneys, I give here the following cursory communication, so far as it possesses interest exclusive of its connection with the other observations.

The case, in which the following observation was made, took place in a person who, in consequence of long continued intermittent fever, laboured under Bright's Renal Dropsy in manifold exacerbations, for more than one year, and eventually died of inflammation of the lungs, in the beginning of May 1851.

Among the points observed on inspection of the body, it may here be mentioned, that the kidneys shewed an enormous enlargement such as I never before observed after frequent examinations of kidneys in this disease, in so far as they weighed respectively seventeen and sixteen ounces. From the degree of degeneration, they presented the form of what is denominated Fatty Kidneys, with considerable new formation of ligamentous tissue.

Microscopical inspection shewed in the cortical substance, notwithstanding the examination of very many thin and thick preparations, only very few urinary *Canaliculi;* and only one Malphighian body did I behold. The few distinct fragments of Urinary *Canaliculi* deviated considerably in appearance from the normal character, in so far as the observer obtained in them throughout, not the distinct appearance of Tesselated Epithelium, but, through the *parietes* of the *canaliculi*, the Epithelia elongated in a peculiar manner, and with this elongation they appeared twined with each other in a cord-like fashion.

In the very small number of Urinary *Canaliculi*, the prepared specimen appeared to consist almost of newly-formed ligamentous tissue, of which bundles of fibres twined manifold in their parcels, permitted themselves to be distinctly seen; while on the margin, individual fibres, shewing themselves by their mace-like swellings to be more recent formations, were observed. Fusiform bodies in early stages of development, of the usual shape, were, at most, to be seen only in small numbers in the moistening fluid surrounding the preparation. This fluid, however, contained a quantity of epithelial cells, of which only a very small proportion presented the normal shape; more were round in figure; while the majority appeared in the progressive transition stages to the shape of cylinder-epithelium, and finally, in still more considerable elongation to the fibriform termination. I here remark, that to me it has for a long time appeared probable, that the fusiform bodies may arise not only from what are named granule cells, consequently from pathological exudation, but also directly from the Tesselated Epithelium of the urinary *canaliculi*; nevertheless I have not been able to obtain certain grounds for this opinion; hence I availed myself of the present opportunity to obtain more accurate evidence on the question. This gave the following series of developments with a magnifying power of three hundred.

1. Cells which present completely the aspect of Tesselated Epithelium and are comparatively large; in these an evident

nucleus, within which are one or more nucleated corpuscles; the cell-content in general, shaded something finer or more coarse-grained.

In the reference to the figure of these Cells, the author remarks that these Cells are the smallest in number.

2. Cells quite as large and similar in shape to these, with manifest *nuclei*, as above circumstanced; but which cells make an approach to the pyriform shape.

3. Cells, as concerns the nucleus circumstanced as the preceding, but in shape still more approaching the following ones.

4. Epithelium Cells, which look perfectly like Cylinder Epithelium; in these there is always a distinct nucleus circumstanced as above.

5. Cells like the latter, only with more elongated thread-shaped ends. Part of these are from the cortical substance, have tapering extremities; part from the medullary substance. These have a round or spherical figure terminating in a sharp tapering point. These are the most numerous in proportion to the rest.

6. Similar Cells, but in which, besides the more strongly elongated end, the broader or more obtuse end also is tapered. These cells always correspond in their considerable size and in their shape to the expanded middle of the Epithelial cells. The more pointed the other end is, the more indistinct is the nucleus, and there are seen, instead of it, several granules lying beside each other, the enlarged nucleated corpuscles, while the content of the cell appears indistinctly shaded. Figures of these cells are given, both from the cortical and the medullary substance. The figure from the cortical substance is irregular, swelling out, however, in the body, and has two pointed extremities. The general character is oblong-oval. The figure from the medullary part is regularly rounded or spherical at one end, and at the other terminates in a gradually tapering point. Many of these cells resemble the *Corpora caudata*, or tailed bodies, seen in various tissues by the microscope.

7. Lastly, with the more considerable elongation of the process or point, the Cell loses its similitude with the Epithelial Cell; the nucleus and content become indistinct; but from the greater thickness in proportion to that of the usual fusiform bodies, the middle appears still distinguished, as it presents in front the new formation of ligamentous tissue. The figure represented is an elongated fusiform body, with two pointed tapering extremities.

Each of these transition forms was seen by me not in some few specimens, but as I deduced the examination, in a very large amount of hundreds of preparations of Cells. For the figures, I have employed only the most necessary and the most instructive cells.

Further, the microscope offered the two following modes of development.

1. The observer beholds very small round cells of the size of the nucleus of the upper Epithelial Cells; within these several small corpuscles, which appear as cells most like to Epithelial Nuclei, yet not the proper granule cells (inflammation globules), to which they correspond well in magnitude.

2. These small cells take a more definite shape, or from them issues directly a small thorn-like process; in many cells these processes are more elongated. But this series is not well observed in its further development, because the number of these cells is very small. The figures of these cells are like round or flattened globules, with pointed or tail-like processes.

3. Lastly, a third mode of development is presented by the observation of the comparatively small fusiform bodies, which usually appear in the new formation of the ligamentous tissue; onward, the cell-fibres, through connection of the same, beginning at first like a string of pearls,—to the completely formed, yet somewhat convex fibres, which compose the mass of the newly formed ligamentous tissue. Of the more recent fusiform bodies, only some individuals, notwithstanding long research, are to be perceived.

Of the medullary substance we must wait for further conclusions, because here the pathological process appears to the eye in a lower stage.

In this substance were distinctly to be seen very many urinary canaliculi; but none had any similitude with the usual aspect. The observer cannot clearly, through the wall, and from the want of isolation, distinguish the individual epithelial scales among the last; still they appear to lie in a similar order, as we know, to that of the usual fusiform bodies; that is to say, the small end of one row or series lying upon the belly or thick part of the other. In other places these deposited bodies appear to have their thin extremities inserted within each other. I have not been able to prepare a satisfactory delineation. The urinary canaliculi are of comparatively large diameter.

In intermediate spaces we find isolated urinary *canaliculi* which are empty, and consist only of a structureless wall, in which the often conspicuous thickening (not further belonging to this), as a smaller edge is to be observed.

The epithelial cells are in the medullary substance visible in much greater amount, in general smaller in size than in the cortical substance. Of the proper normal round shape only few are present; on the contrary, almost all are in the above described different stages of development. Two figures of them are taken from the medullary substance.

As to the second of the series above described, I could see no similar corpuscles with their processes; indeed there were in proportion to the epithelial cells noticed, smaller corpuscles, but which presented the distinct figure of the epithelial cells, cells probably more recent, and which appear all in shape more or less pointed. In the figure these bodies are at one end round, and at the other terminating in long tapering points.

The ligamentous tissue was very abundantly developed, and presented the circumstances of cell-fibres in the cortical substance examined.

On the addition of acetic acid, made in the usual manner, the ligamentous substance became pale, after longer duration, to the degree of indistinctness, while the addition of solution of potash restored the previous appearance. The same was the action of acetic acid upon the fusiform bodies of the third series. Of the epithelial scales, the greater part is, after the action of acetic acid, very clear; only in a few the cell-nucleus appears, in consequence, more distinct, from the paleness of the cell-cover. In the majority also it becomes pale, while addition of solution of potass in many cells in this instance also restores the previous appearance. A part of the cells appears to be entirely dissolved by the acetic acid.

The action of reagents upon the bodies of the second series, I have not had an opportunity of tracing.

The kidneys were preserved in spirits, and were subjected to accurate examination by the microscope, two several times, within the space of ten days. The results were similar to those above stated, so that there can be no ground for any mistake.

We give still once more the results of examination.

I have above placed beside each other the three modes of development from the first. Whether the first in the third series may form a direct transition; that is, whether the full-formed cell-fibres, which we see in these kidneys, and in other kidneys in more advanced stages of degeneration, may arise from the epithelial cells converted into the peculiar fusiform bodies, consequently shewing a complete transition to the shapeless ligamentous or cellular tissue, I must leave at present undetermined. Certainly, though individuals of these completely formed necklace-like cell-fibres were remarkably thick-bellied, or uneven in the middle, on the other side some of them were unchanged epithelial scales, distinctly thread-shaped in the long direction, while still their origin was betrayed.

But what would decide the point, that is a connection of the terminal processes of the cells, which are seen with their nucleus still clearly distinguishable as epithelial structures, and consequently an incipient fibre-formation, I am unable to discover. In other respects there is no reason which contradicts such further development into fibres; and consequently the contribution to the augmentation of the cellular connecting tissue, when once the development of the epithelial cells into fusiform bodies, with loss of nucleus, is proved. It is interesting to observe, that here the pathological process embraces all the well-known physiological transition stages, from Pavement or Tesselated Epithelium to Cylinder Epithelium, and then to further development.

If, however, the transition from the first to the third series is possible, it appears to me that in these kidneys it had not yet taken place. The very small quantity of thin, wasted, fusiform bodies in early stages of progress, the entire absence of the same in more recent stages of development, and the great amount of clearly further formed cellular connecting tissue, as also the absence of free elementary granules and granule cells, appear to prove this, that the development of the newly formed, complete cellular tissue, as is shewn in the forms of the third series, had, at an earlier period of the disease, taken place from the pathological *blastema*, and that the conversion of the epithelial cells was a newer phase of disease, which was unable hitherto to contribute to the augmentation of the peculiar cellular tissue.

As to the second-mentioned series, I have already said, that this form of cells was small in number, and therefore do not permit me to form any conclusion. I might, in the further absence of elementary granules, doubt, that these cells united were granule cells in a more advanced state of formation, which also their aspect contradicted. They looked most like to an epithelial cell nucleus; only I could find no further formation in any way from the same nucleus-fibres which were formed.

[Dr Mazonn has described, with great minuteness, and, it can scarcely be doubted, with great fidelity, the changes which take place in the fatty degenerated kidney. These changes chiefly amount to this. The Tesselated cells, and probably the other cells, both of the cortical and the medullary matter, lose their normal shape; they become elongated;

the nucleus is either destroyed, or otherwise changed; as the elongation proceeds, these cells are converted into fibres or threads; and hence, instead of the normal cellular structure, there is merely a large quantity of ligamentous structureless tissue. These changes appear to be part of a general system, which is, that in all processes of disease, and especially where there is disintegration and change of structure, the tendency is to pass from the spherical, or globular, or polygonal cells, to the cylindrical and coneidal, and, finally, the elongated or fusiform shape, and thence into that of the thread-like or fibrous tissue. It is in the stage between the cylindrical and the fibrous, that the fusiform bodies, and the caudate or tailed bodies are observed.]

ART. XI.—*Postscript to Article Eighth on Lucifer-Match Makers' Disease.*

One curious result obtained by the chemical researches of Dr Von Bibra, is, that the purulent matter discharged from the diseased parts contains proportionally a considerable quantity of phosphorus.

The purulent matter from the upper jaw of one patient, Maria Gross, aged twenty-three, was gray, badly coloured, and of a most offensive smell; yet under the microscope, were found only normal pus-corpuscles, some molecular corpuscles, and individual mucous cells.

The purulent matter contained,

Solid parts, .	7·02	to 7·04
Water, . .	92·98	to 92·96
	100·	100·

Fat in 100·00 parts of undried substance, 0·83 – 0·13. This fat contained in one experiment 12·19 per cent. of phosphoric acid, corresponding to 5·35 per cent. of phosphorus.

In another, experiment 4, analysis gave 12·80 per cent. of phosphoric acid, corresponding to 5·67 per cent. of phosphorus.

In another trial with the purulent matter from the upper jaw of Katharine Koget, the fat contained in 100 parts, 9·43 per cent. of phosphoric acid, representing 4·14 per cent. of phosphorus.

This patient, Katharine Koget, died of abscess in the brain; and the fat of the purulent matter of this abscess also gave 7·20 per cent. of phosphoric acid, representing 3·06 per cent. of phosphorus.

Similar results were obtained by examining the purulent matter from the lower jaw of another young female, Kunigunda Weber, aged twenty-two years.

Dr Von Bibra is aware that to these experiments it may be objected, that phosphorus is, in the form of phosphates, naturally contained in several animal textures and liquids. To this he answers, that, after experiments, he finds that in no case is the same proportional amount of phosphoric acid or phosphorus found in the fat of the human liver, muscular flesh, fatty matter of the brain, or in the fat of the purulent discharges in other diseases. He therefore draws the conclusion, that, " without doubt, there is a considerable proportional quantity of phosphorus in the fat of the purulent matter which is secreted in the disease of the jaws, induced by phosphorous vapours."

ART. XII.—*Note from Mr John S. Milton in reference to his work on the Treatment of Gonorrhœa.* Volume seventy-eighth, p. 410.

To the Editor of the Edinburgh Medical and Surgical Journal.

SIR—In an excellent article on Aphroditic Diseases in the last number of your Journal, there occurs the following passage :—" Mr Milton is disposed to *deride* the opinion of John Hunter, that in the majority of cases of Gonorrhœa, medicine has little or no control over the disease."

In all respects but this, the criticisms you have done me the honour to pass on my work, are thoroughly impartial, correct, and satisfactory to any author, however sensitive. The review stands out in honourable contrast to what we occasionally see ; immoderate praise by the friendly journal, hasty, irrelevant censure in the hostile or indifferent; often got up by persons who either have not noticed facts, or will mistake meanings.

Hence I feel more than unusually anxious to set my opinions in respect to Hunter, in the true light before you. God forbid I should ever deride an opinion of his. I have too much respect for every line traced by Hunter's honoured hand ever even to think, much less to speak, with disrespect of him.

All I meant to state was that Hunter had expressed this unfavourable opinion of the treatment of Gonorrhœa *in his day.* Had he lived to write his great work on Venereal Diseases within the last twenty years, I feel confident that he would not have recorded such a condemnation of means which visibly cure the disease.

I have the honour to remain, Sir, yours obediently,

JOHN S. MILTON.

PART II.

CRITICAL ANALYSES.

ART. I.—*Traité des Maladies de Plomb. ou Saturnines.* Par L. TANQUEREL DES PLANCHES, Docteur de la Faculté de Medecine de Paris. Tome Premier, pp. 550; Tome Second, pp. 551. Paris, 1839. 8vo.

Treatise on the Diseases arising from the Action of Lead on the Human Body. By L. TANQUEREL DES PLANCHES, Doctor of the Faculty of Medicine at Paris. Two volumes 8vo. Volume i., pp. 550; Volume ii., pp. 551.

2. *Notices of the Effects of Lead upon the System.* By JAMES ALDERSON, M.A., and M.D., Physician to the Hull General Infirmary, Fellow of the Royal College of Physicians, London. (Read January 8th, 1839. Transactions of the Royal Medical and Chirurgical Society, volume the twenty-second. London, 1839. 8vo. Pp. 82–94.)
3. *On a Remarkable Effect upon the Human Gums, produced by the Absorption of Lead.* By HENRY BURTON, M.D., Fellow of the Royal College of Physicians, and Physician to St Thomas's Hospital. (Read January 14, 1840. Medico-Chirurgical Transactions, published by the Royal Medical and Chirurgical Society, volume the twenty-third. London, 1840. 8vo. Pp. 63.)
4. *Cases of Poisoning by Lead at Claremont.* By Dr R. GUENEAU DE MUSSY. (Dublin Quarterly Journal, No. 14. May 1849.)
5. *Some Remarks on the Contamination of Water by the Poison of Lead; and its Effects on the Human Body.* By JAMES BOWER HARRISON, M.R.C.S.L. London, 1850. 12mo. Pp. 32.

6. *Some Observations on the Contamination of Water by the Poison of Lead, and its Effects on the Human Body; together with Remarks on some other modes in which Lead may be injurious in Domestic Life.* By JAMES BOWER HARRISON, M.R.C.S.L., &c., &c. Formerly Physician to the Andover and Ancoats Dispensary, &c. London, 1852. 12mo. Pp. 196.

[Continued from volume seventy-seventh, p. 199.]

The previous examination of professions engaged in working with lead and its salts, is chiefly useful in enabling the physician to form correct notions regarding the channels through which this insidious metallic poison may be introduced into the animal economy. By a cursory observer it might be imagined, that it could only be introduced by means of articles of food and drink, by water, wine, or other fluids in which the mineral is dissolved in very minute quantities. Little doubt can be entertained that it very often is introduced in this manner; and the facts mentioned in the article in volume seventy-seventh, afford ample information of the truth of this inference. This, nevertheless, is not the sole channel; perhaps it is scarcely to be regarded as the most frequent channel by which lead is introduced into the system. The facts already adduced shew, that it is chiefly in consequence of the diffusion and dissemination of lead particles in the atmosphere, that this mineral is so often applied to different absorbing surfaces of the animal body. When Mr James Wilson described in the year 1754, ninety-nine years ago, the effects of the Mill Reek at Lead Hills, he gave a very convincing and conclusive proof of the two facts;—that the lead or its ore is converted into a vapour capable of floating through the air, and that lead so conveyed may enter the system of the respiratory mucous surfaces, and thus produce the proper effects of the poison of lead.[1] These two facts have received ample confirmation from the evidence collected by subsequent observers, and by no one more fully and correctly than by M. Tanquerel des Planches.

In the greatest number of professions, the workman who is working with preparations of lead, detaches from them very minute particles, which are instantly dispersed in the form of dust or vapour in the surrounding atmosphere. This conversion of lead into particles and vapour takes place in different modes; but two circumstances deserve particular attention. *First,* heat, percussion, braying, friction, are means of disseminating lead particles in the air in constant operation. In the *second* place, substances mixed with lead for different purposes, by being volatilized, carry with them such minute and subtle particles as are sufficiently light to admit of this mode of transport. Such substances are oil of turpentine, carbonic acid gas, sulphuretted hydrogen, and many other vapours and gases which are accidentally in contact with preparations of lead, or which are put in contact with them for purposes in the arts. The workmen of these professions are so much more frequently and quickly attacked by colic, as they are engaged in working in large quantities of lead, and as the poison is more abundantly disseminated in the atmosphere in the form of dust and of vapour. In these circumstances the mucous membranes which cover the digestive and respiratory passages, are in immediate contact with the poison which is to produce lead colic.

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[1] Account of a Disease called Mill Reek at Lead Hills, &c. By James Wilson. Essays, Physical and Literary, vol. i., page 450. Edinburgh, 1754.

Among workmen who are placed amidst an atmosphere more or less loaded with particles of lead, the air which passes without intermission through the mouth to go to the lungs and also the stomach, carries a certain amount of poisonous emanations, which are thus put in contact with the mucous membrane of the mouth. The bluish tinging of the teeth and gums which is observed in these persons, as well as the leaden taste of which they are sensible, indicate the traces of the passage of the lead through the mouth. The absorbing power of the mucous membrane of this cavity is well known. The author accordingly infers that by this a certain proportion of the poison may be absorbed. In addition to this, the saliva passing without ceasing to the organ of chymification must convey to the stomach a portion of the lead particles which it has dissolved, and which give rise to the sensation of the saccharine astringent taste. Lastly the experiments of modern physiologists have sufficiently proved that at each inspiration a portion of the air which passes by the mouth goes to the digestive surfaces ; as the atmosphere of the manufactory, however, or workshop, is mingled with saturnine particles, these last must be carried into the workman with the air which is conveyed thither.

The facility with which poisons, medicines, drinks, put in contact with the mucous membrane of the stomach, are absorbed by it, is too well known to require being more than mentioned.

The notions recently brought forward by physiologists and pathologists, upon the activity of absorption exerted by the mucous membrane of the respiratory organs, lead us to admit, *à priori*, that lead preparations, reduced to the molecular or atomical condition, suspended in the air, may very easily penetrate into the system by this channel, and finally induce lead colic.

Here it must be remembered, that all those poisons which are applied to the system in the state of vapour, of smoke, of gas, or miasmatic exhalation, in order to produce their deleterious action upon the system at large, enter most usually by the respiratory organs. It is sufficient to breathe for a short time air loaded with turpentine particles, in order that the urine may acquire the odour of violets. The deleterious miasmata and vapours, as that called *le mitte*, and mephitic airs in general, all are inspired with the air, and produce either asphyxia as a primary effect, or secondary effects, according as they are concentrated, or in so diluted a form as to be absorbed without inducing asphyxia. The same may be said of the putrid miasmata, which, in the experiments of M. Magendie, produced in the animals compelled to breathe them peculiar diseases. In short, absorption by the pulmonary surface must be allowed to be the principal, and probably the most frequent channel, for the introduction of those injurious and poisonous elements, which, in certain epidemics and endemics, give rise to plague, typhus fever, ague, remittent fever, yellow fever, dysentery, and cholera. Numerous facts tend to shew that respiration is the great channel through which the causes of these diseases operate.

It is certain that a workman, placed amidst an atmosphere of lead vapours and particles, must absorb a large amount of them by the respiratory passages. In point of fact, in consequence of the continued entrance into his system of air saturated with this poison, a considerable number of poisonous particles must be almost incessantly in contact with the mucous membrane which lines the nasal cavities, the larynx and the bronchi. The mucus by which these parts are lubricated readily dissolves these particles, and the mucous membrane very quickly absorbs them.

When we visit these manufactories, the poison makes its presence and its action is speedily felt upon the mucous membrane and the organ of smell. The fetid air, which is distinguished by a peculiar odour, and which is inhaled by the workmen, who eventually are attacked by lead-colic, proves directly the contact of the poison upon the other points of the mucous membrane which covers the respiratory passages.

Some authors will not admit the absorption of lead by the respiratory passages of the workmen. They think that if such were the case, the lungs, instead of the digestive organs, would be first attacked by the poison. But these authors overlook and disregard the fact, that a large proportion of poisons, which, absorbed in the form of vapour, of gas, or of dust, exert their deleterious action on the brain, the digestive, or the urinary organs, pass most usually through the respiratory passages, without sensibly altering the functions of these organs. Such are turpentine, various putrid vapours. Mercury also, though it is absorbed by the skin, does not usually induce any functional changes in that membrane.

M. Palais will not admit, as a possible occurrence, the pulmonary absorption of lead particles ; because, he argues, were this the case, we ought to observe symptoms of irritation of the pulmonary mucous membrane. Daily observation, nevertheless, demonstrates the small degree of sensibility possessed by the bronchial mucous membrane as to solid bodies reduced to an impalpable powder ; and if lead, or its salts, when reduced to a state of extreme division, were irritating bodies to the bronchial mucous membrane, it is not easy to see why the mucous membrane of the mouth, pharynx, nasal cavities, and conjunctiva, though more exposed than the former to the action of this dust, should be protected from every irritation from the cause mentioned. Physycians have not observed, nevertheless, in plumbers, instances of inflammation of the mouth, of the throat, coryza, or ophthalmia, which could be referred to the action of lead. In one white-lead worker, M. Tanquerel des Planches observed ptyalism and an attack of *angina*, caused by a fistula, the consequence of a carious tooth. This person having been attacked by colic, was considered by some physicians who saw him at La Charité, as labouring under salivation from the action of lead. But attentive examination speedily brought to light the true cause of these symptoms, which had presented the appearance of those of colic.

Lastly, men and animals which have been attacked by colic, in consequence of having slept in apartments newly painted, and dogs, in which colic has taken place after they have received by their respiratory organs lead vapours, have presented no symptoms of irritation of the pulmonary mucous membrane.

All these facts lead to the inference, that lead, in the form of minute impalpable powder, or of vapour, though it may not cause a primary affection of the parts and textures over which it passes, that is, an affection cognizable by specific symptoms, yet by successive introduction becomes accumulated within the system to such an amount as to induce all the phenomena of its peculiar poisonous action, and the specific diseases which are known to arise from the presence of the mineral within the economy.

Stockhausen alleges that individuals who work at lead converted into vapour, absorb a certain quantity of this poison by the lungs, and that this gives rise in those persons to pneumonic and pleuritic attacks. This statement the author has not supported by any proofs. M. Tanquerel des Planches considers it as a mere hypothesis; and he adds that he has never seen attacks of inflammation produced by the action of lead.

Another opinion brought forward within the last twenty years, he also pronounces to be exposed to great doubts. This is the statement made by various authors, among whom are Broussais, Benoiston de Chateauneuf, and Lombard, that phthisis or pulmonary consumption, is a frequent disorder among plumbers, painters, and similar workmen. M. Tanquerel des Planches maintains in the most decided terms, that these workmen form one of the professions in which the smallest number of phthisical persons is observed. Among twelve hundred and seventeen individuals labouring under lead-colic, he found not more than fifty-five tubercular patients, of whom fifteen were painters, among a total number of three hundred and eighty-eight. He thinks even that this result shews, that the profession of plumbers acts, in a slight degree, as preventive of phthisis. He allows, however, that it is not safe to establish, at present, upon this question any positive inferences.

Regarding the comparative sorbefacient power of the pulmonary and the alimentary mucous surfaces, it is not easy to make any fixed propositions. The author is disposed, however, considering the extent of membrane exposed to the air, to think that the pulmonary mucous surface exerts a more potential influence than the alimentary.

The ophthalmic or conjunctival membrane is small, and cannot contribute very much to the introduction of these vapours and powders. As however these are in constant contact with it, and as tears and other secretions may facilitate absorption by causing rapid solution of the salts, M. Tanquerel des Planches is of opinion that poisoning by lead may be thus produced, unless care be taken, by means of a mask, to prevent the particles from settling on the moist membrane.

Absorption by the skin, M. Tanquerel des Planches thinks is confined to a very small number of professions. He has met with only one instance in which workmen so engaged have been attacked by lead colic; and he allows that this may seem to denote absorption by the skin. But he properly adds, that these persons might have taken their food without washing their hands, and consequently that it is quite uncertain whether the lead particles were introduced through the skin or along with the food into the alimentary canal. To this order belong compositors, persons that rub and clean printing-types, platers, dyers, in some instances calico-printers, hair-dressers, and a few more.

He entirely denies the correctness of the statement, that lead particles adhering to the clothes of workmen can be thus absorbed, and give rise to symptoms of lead-poisoning. He thinks that it is a mere hypothetical notion, not founded on facts. It is evidently his opinion, that the lead particles can neither in substance, nor any other form, force their way through the epidermis; that, in short, so long as this covering remains sound, lead is not absorbed by the vessels of the skin. This is certainly in accordance with what has been observed by physicians and surgeons in the employment of saturnine lotions and ointments in the practice of medicine and surgery, and not at variance with ascertained facts, as to the operation of lead where it has been introduced into the system.

After these preliminary observations on the subject of causes and their modes of operation, M. Tanquerel des Planches establishes the following general conclusions, as deductions from an extended and careful examination of facts.

1. All those workmen who, in the course of their labours, disseminate through the atmosphere particles of lead, have their mucous membranes, and particularly those of the digestive and respiratory passages, in contact with these emanations. These poisonous particles, after having been absorbed by the surface of these membranes, give rise to lead colic. Those workmen, on the contrary, who work with lead in the fixed state, are not attacked by colic. The skin only is capable of absorbing a quantity of saturnine particles capable of giving rise to this disorder.

The saturnine substances which are most easily reduced into floating and disseminable dust, or into vapour, are those which most frequently induce lead-colic among workmen. Such are Ceruse or White Lead, the Carbonate,—Minium or Red Lead, and Litharge, or the Semi-Vitreous Oxide of Lead.

2. But as it has been seen, that equally in cases of colic which have taken place in persons not belonging to professions engaged in working with lead, the poison, in

order to give rise to this species of poisoning, can be only absorbed by the mucous membranes, it must therefore be inferred, in a general manner, that the symptoms of lead-colic are developed only in consequence of the absorption of saturnine preparations by the mucous membranes of the organs of respiration, of digestion, of the conjunctival membrane, and those of the generative organs.

M. Tanquerel des Planches, when he first began his researches upon diseases arising from the poison of lead, believed, like most practitioners, that the absorption of the metal might be effected by the skin, and might produce colic like the other forms of lead-poisoning. He could discover no reason, *à priori*, for denying to this membrane its absorbing property; and he did not understand how this channel might not have served as a passage to the material cause of the colic symptoms, when he beheld other diseases produced from the absorption of a metallic poison by the surface of the skin. The experiments, however, which he has related, and the visits which he made to the establishments in which men were working in lead, speedily overturned the ideas which had been suggested by hypotheses, and which are given in his Thesis upon Lead-Palsy, published in 1833-34. These elucidations of his early opinions the author thinks so much the more necessary to be given, because that opinion contributed much to lead physicians into error regarding the actual channels of the absorption of lead.

In this manner, therefore, the controverted question concerning the channels of the absorption of lead, the author thinks, may be regarded as resolved in the instance of lead-colic.

Before quitting this part of the subject, however, it is requisite to say, that the inference, that lead is not under ordinary circumstances absorbed by the skin, does not disprove the absorbing faculty of this membrane. We know that mercury, croton-oil, cod-liver oil, opium, and several other articles, may by friction be made to be absorbed and taken into the system, so as to produce physiological effects. When the skin is exposed to the influence of lead, the metal is not rubbed or forced through the epidermis by rubbing; and hence, in ordinary circumstances, if exposed to lead vapour, or the salts or oxides of lead in powder, it cannot be justly said that the metal is absorbed by the skin. On the other hand, M. Tanquerel des Planches has attempted, in various experiments upon animals, such as dogs and rabbits, to produce absorption of the preparations of lead, especially the carbonate, by rubbing it in the form of ointment over the inner parts of the thigh, previously deprived of hair; and in all these instances he has been unable to recognise the effects of the mineral upon the system by any of its wonted consequences. It must be allowed that there is here a difficulty with regard to the admitted doctrines of absorption,—an exception to these doctrines,—if it be fully proved that lead is in no case, and cannot be, forced through the epidermis. The question arises, why should mercury, gold, turpentine, croton-oil, all be capable of passing through the epidermis, when impelled by friction, and lead, and its salts not be capable of the same mode of introduction into the organism. We do not here question the correctness of the conclusion of the author as to the ordinary modes in which the skin, when exposed, may absorb. These may be quite well founded. But they are at variance with the known facts of cutaneous absorption; and it would be desirable either to see the two classes of facts reconciled or explained. In the former article, in volume seventy-seventh, p. 174, are given those observations which we felt it necessary to offer on this question.

It would be interesting to be able to calculate with exactness the amount of lead particles which is absorbed by the mucous surfaces, in instances in which lead-colic is produced. This, however, M. Tanquerel des Planches thinks it impossible to do. In different patients different quantities appear to be followed by the same effects. From several cases given in page 61 and the following, it appears, that in cases in which lead-colic had taken place, lead-preparations are absorbed by the mucous surfaces in very different amounts, from one grain to one hundred and forty grains.

It is still more difficult to estimate the quantity absorbed in those instances in which lead dust or vapour is diffused through the air. Among several individuals who are placed in the same circumstances for absorption, some are attacked by colic at the end of eight or ten days of work, while others do not shew symptoms of the disease till the end of several months, and even of several years.

A peculiar opinion is maintained by M. Merat, who thinks that the particles of lead do not require to penetrate into the economy in order that lead-colic may be produced. In order to support this opinion M. Merat affirms that the workmen who work with lead, without any other preparation than beating it, and the individuals who inhabit newly-painted apartments contract symptoms of colic, though they have not been in immediate contact with preparations of lead. To the first of these statements the author answers that the workmen of the first of these professions, do not absorb, it is true, metallic particles by the mouth and the respiratory passages; and they are never attacked by lead-colic, when they confine themselves only to the operation of beating metallic lead, as sheet-makers.

The second proposition M. Tanquerel des Planches pronounces to be erroneous. The explanation given by M. Merat to prove the certainty of the statements which he makes, rests upon no solid foundation. "The emanations alone of lead," says M. Merat, "are sufficient to induce colic. This name I do not apply to the vapours which rise from the lead in the melted state, or even from the beating of its preparations, but only to the odorous element, a peculiar aroma which is very strong, when lead is held in the hands and rubbed." This aroma M. Tanquerel des Planches regards as a compound of lead particles; and this aroma, while acting on our senses, penetrates into the economy. The question seems to be a dispute about words. M. Merat refuses to apply to the word emanation the usual meaning which other physicians and chemists assign to it; and he imagines a distinct substance, for it must still be a substance, even though a vapour, which impresses the sense of smell. The distinction seems both unnecessary and unphilosophical; and we thought that it had been established fully a century and a-half ago by the experiments of Boyle and other natural philosophers, that in all instances, in which the organ of smell is impressed, that impression must be produced by the application of minute particles of the odorous substance to the mucous membrane of the nostrils.

Lastly, continues M. Tanquerel des Planches, from the fact that neither the liquids nor the solids of the economy, when subjected to chemical analysis, have hitherto evinced the presence of the smallest quantity of lead, it must not be inferred, with the author now quoted, that this poison has not entered the system. A considerable number of mineral poisons, after having been introduced and absorbed into the organism, give rise to a train of symptoms quite characteristic; and, nevertheless, chemical analysis has not been able to prove the presence of these substances in the solids and in the fluids. We are not entitled from this circumstance to conclude that these substances are not present.

All the instances of colic, M. Tanquerel des Planches adds, which he has recorded, in which lead was visibly deposited and absorbed at the mucous surfaces, further prove, in opposition to M. Merat, that lead must enter in substance into the economy, when it gives rise to lead-colic.

It must further be allowed, that saturnine compounds once absorbed at the mucous surfaces, must be carried into the general current of the circulation, and then directed to the organs which are to be affected. It would be curious to know the intimate mode of the action of lead upon the tissues of the economy. The old physicians thought of many hypotheses to endeavour to discover this intimate action. But all their efforts, and even those of several moderns, have only elicited the acknowledgment that this action completely eludes our senses; much in the same manner, in which we know not the action of strychnine on the nervous centres in producing convulsions, the action of opium upon the brain, that of cinchona in curing intermittent fevers, and all similar agents. Lead, after having been absorbed proceeds preferably to exert its noxious influences upon the digestive and urinary organs, by virtue of an attraction or sympathy, the secret of which we understand not.

Most ordinarily, lead-colic shews its phenomena in man, when he is placed amidst circumstances favourable to the absorption of the metal. In some instances the poisonous action shews its operation, only when the individual has ceased to be exposed to it for a period of longer or shorter duration, shewing that the morbid effects of the lead are not in all cases felt immediately after its introduction into the economy, and that it may remain there without causing colic. Lastly, the author has seen several persons, who, not having been for several years in contact with lead, have nevertheless been attacked with colic, and the other forms of lead poisoning. But among these persons there were always observed one or more of the characteristic symptoms of primary lead-poisoning.

It is one of the results of the facts given in the preceding observations, that all the persons who are in the same circumstances in contact with lead, are not equally ready to contract lead-colic. This gives rise to the question, whether, independent of the poisonous cause, there be in the conditions in which individuals are placed, certain circumstances which are favourable or adverse to the deleterious action of lead-preparations. In order to form an estimate of the force of these several influences, the author considers shortly the relations of seasons, climates, age, sex, constitution, and regimen. These form, or may be supposed to form, the circumstances which predispose to the open action of lead-poisoning upon the system.

Seasons.—M. Tanquerel des Planches has remarked, like many other authors, that at certain periods of the year lead-colic is rare, and at other periods it is very frequent. Part of these differences may be ascribed to the greater or less activity of the works, and consequently to the number of workmen employed. For example, the white-lead manufactories are sometimes for whole months in winter in a state of quiescence, and more than half the house-painters cease working on the approach of cold weather.

Among the number of twelve hundred and seventeen patients subjected to examination at different periods of the year, the numbers were distributed according to the months in the following manner.

January,	67		
February,	77		
March,	95		
		239	
April,	99		
May,	115		
June,	137		
		351	
			760
July,	190		
August,	127		
September,	92		
		409	
October,	81		
November,	78		
December,	59		
		218	
			1217

From this table it appears, that the warm months of June, July, and August, are those in which the greatest number of cases of lead-colic is observed. During these three months they amount to 454, or fully one-third of the whole number. During the six warm months of the year the number of attacks amounts to 760; during the six cold months the number is 457. It thus appears that the numbers taking place during the three warmest months of the year, 454, is as great as that taking place during the six months in which the temperature is either cold or much lower than during the warm months; that is, the numbers are actually twice as great in the former period as in the latter.

By frequent visits at the manufactories of white and red lead, and at the other workshops where men are working with lead-preparations, the author satisfied himself that, every proportion otherwise being equal, the number of diseased workmen is greater during the warm months than the cold periods of the year. Making every allowance for the different degrees of activity of the works, and of the number of workmen employed, it must be allowed as a final inference, that heat predisposes to the formation of lead-colic, either by favouring the dissemination of the minute particles, or by rendering more favourable the apparent channels for the introduction of the poison.

Individuals there are, who every year, nearly at the same period, contract symptoms of lead-colic, though they perform at all times absolutely the same work, from the commencement of the year to the time at which they become unwell. Summer is the most ordinary season for these attacks.

Climate.—In order to obtain positive information, whether climate exerts equal influence upon the production of lead-colic, it would be requisite either to visit all the principal countries of the world, or for physicians residing in different countries to furnish numerous and correct facts upon this point. Without this information no positive statements can be made. Analogy, however, leads to the belief that, in warm regions, a greater number of cases of lead-colic ought to be observed than in countries temperate and cold. The author states, however, that he has learned that lead-colic is not modified in its aspect according to climate. It presents the same symptomatic expression in all the countries of the habitable globe.

Age.—The persons who work in white-lead and red-lead manufactories, and the house-painters, who form the majority of patients, are in general men between the ages of thirty and forty years; because, to follow these occupations, the workmen require to be vigorous, and individuals of this age are more numerous than those at other ages. From this it may be inferred, that this period of life predisposes to attacks of lead-colic. This consideration, however, does not oblige us to give entire confidence to the following return, to prove that any particular age predisposes to the formation of colic.

Ages of 1217 *Patients.*

From five to ten years, . . .	8
From ten to twenty years, . .	80
From twenty to thirty years, . .	244
From thirty to forty years, . .	445
From forty to fifty years, . . .	277
From fifty to sixty years, . . .	118
From sixty to seventy years, . .	39
From seventy to eighty years, . .	6
	———1217

Children are in general little employed in the different occupations in which preparations of lead are manufactured and worked. It is, nevertheless, certain that they contract the disease with great facility. In the manufactory of glazed cards and fancy papers in the Rue Meslay conducted by M. Hangrand, it is remarked that the five or six children who are there employed, are frequently attacked by the distemper, while the adults most rarely suffer. Upon several occasions it has been found necessary to dismiss temporarily all the children, because they too frequently become unwell. Several masters of house-painting establishments have been obliged to put a temporary cessation to the apprenticeship of young persons, in consequence of their being too often attacked by colic. Subsequently these same persons have returned to the same occupations, and the poisonous disorder has not returned, or has done so very rarely. As very young children are not usually placed in circumstances calculated to favour the formation of lead-colic, it is impossible to know whether they are more or less predisposed to the disease. M. Baron, physician to the hospital for new-born infants, informed the author that he had never observed lead-colic in infants at the breast. Chaussier states, that white-lead employed in dusting the excoriations on the thighs of young children, has given rise to lead-colic. The occurrence of constipation, of hardness and depression of the abdomen, of vomiting, of dysuria, of screams, moaning, and great agitation, as well as the refusal to take the breast, after the use of white-lead in this manner, may certainly enable the physicians to suspect the presence of lead-colic in these young creatures. It must nevertheless be acknowledged that the diagnosis is involved in great difficulties.

The author has several times met with old men who ceased to be attacked with colic after they have arrived at an advanced age; and, nevertheless, these persons were placed in those conditions of contact in which formerly they had been taken with illness. In the white-lead work of Courbevoie, he saw two old men, who had worked, the one eighteen months, the other two years, without being affected by colic, while middle-aged adults could not work in it longer than from one to two months without being affected by the disorder.

M. Tanquerel des Planches is anxious, nevertheless, to avoid and caution others against drawing general inferences from the facts now stated. The only positive inference that he thinks is warranted is this, that the greatest part of patients who are observed to be attacked by lead-colic are adults.

Sex.—Females being from the nature of their habitual occupations not much exposed to the action of those vapours which give rise to lead-colic, ought for the same reason to be attacked by this disease much less frequently than men. Among the whole number of twelve hundred and seventeen patients examined by the author he found not more than fifty-seven females, who were employed in rubbing printing-types, females employed by painters, or in the white-lead manufactories. In general females, allowance being made for all differences, are less frequently attacked than men. The author proposes the question, whether this proceeds in part from the preservative means which they more willingly employ than men, or does it depend upon differences in organization? Some practitioners have stated that women not being employed in the same operations as the men in those establishments in which both sexes are admitted, it might happen that the former are less frequently attacked, because they are engaged in labours less fatiguing and less dangerous. At the white-lead manufactory of Courbevoie, the women are employed in the same operations as the men ; and nevertheless they are less frequently attacked by colic than the men.

Constitution.—The persons among whom lead-colic is observed are of all sorts of constitutions, and present the attributes of all the temperaments. As, however, the great part of the professions in which the workmen work at lead on the great scale, require from the majority of workmen a great amount of strength, it is not wonderful that we should frequently meet with patients possessing a strong constitution.

Among the twelve hundred and seventeen patients seen by the author, five hundred and eighty-five presented a medium constitution ; four hundred and twenty-four were endowed with a strong constitution ; two hundred and eight bore the marks of a feeble constitution.

As to *Temperaments*, persons sanguine, nervous-lymphatic, appear nearly in equal degrees susceptible of being attacked by the poison.

Cleanliness.—Inattention to cleanliness may, as has been seen, contribute to the formation of painter's colic. Most of the workers in lead, if they are not careful to wash their hands, particularly before taking their meals, in order to reremove from the skin the saturnine particles with which it is covered, are susceptible of contracting lead-colic, in consequence of swallowing with their food, the poison which is detached from their hands.

Regimen.—It is generally believed that bad food and errors in regimen, such as excess in food and drink, greatly predispose the workmen to contract colic. The following results of the researches by M. Tanquerel des Planches are given.

The majority of manufacturers, masters of shops, and workmen, think that excesses in drinking powerfully predispose those who attach themselves to the practice, to be attacked by the disease. The greater part of white-lead makers and house-painters lead lives most irregular, and seldom pass a week without being intoxicated at least once. The result is that patients are frequently ascertained to be addicted to drinking. Notwithstanding this, among the workmen who are habitual drinkers, the author has seen some who resisted the effects of lead-poisoning for years, and for their whole lifetime; since they have never been unwell. These cases, however, are most rare; most commonly men of these habits readily and speedily are attacked by colic. Most frequently sober persons are spared, or if they suffer attacks, this is only after a long period of exposure; and the attacks return only after long intervals. There are on the other hand exceptions which are not very rare; individuals who lead regular and sober lives may work scarcely some days or some months, before they are attacked by symptoms of colic.

In a large number of instances, the author has remarked that the disease is developed the day following, or the second day, after a debauch. Monday is the day of the week in which the workmen of Paris most frequently indulge in drinking to excess; and several times the author has seen the wards of La Charité admit a greater number of patients on Tuesday and Wednesday.

In hospitals it is not easy to obtain correct information upon the habits of patients. They often deceive the physician by their answers, with the view of not disclosing the baseness of their conduct. The only mode of obtaining positive information on this point is to interrogate the masters of workshops, the overseers or under-masters, and the masters or hirers of the workmen, upon the conduct of those patients whose mode of life it is important to understand.

The author was unable to ascertain precisely whether the workmen who work before breakfast contract colic more easily than those who are in the habit of taking food before beginning their labour.

Diseases unconnected with the action of Lead.—M. Tanquerel des Planches has not remarked that the different diseases not proceeding from the action of lead, with which the workmen may have previously been affected, have exerted any influence upon the final development of the symptoms of lead-colic. It is natural to think that individuals suffering under habitual constipation, are preferably and most frequently attacked by intestinal saturnine poisoning. That this is not the case, the author affirms in the most positive manner, having frequently directed his researches to this point. He has met, among the workers among lead, with individuals labouring under different diseases of the alimentary canal and the urinary apparatus; these persons he has not found to be more or less frequently attacked by saturnine colic than their fellow-workmen, whose organs were in good condition.

The influence of Lead-Diseases.—The other lead-diseases predispose to the approach of colic. So long indeed as any one of the forms of lead-poisoning is present, the fact proves that the mineral is in some part of the organism; and consequently it may, by particular circumstances, be directed to the digestive organs and give rise to colic. Colic is observed more frequently to succeed to Arthralgia than either to Palsy or saturnine Enkephalopathy.

Considerable discrepancy, at least little regularity, is observed to subsist between the development of the disease and the time during which the individuals have been exposed to its causes. Some workmen continue working at lead for ten, twenty, or thirty years, without being attacked during all this time. Yet at length they are affected by it, though no change can be perceived in the circumstances in which they are placed. The constitution alone in these persons appears to have slowly undergone some modification. Conversely lead produces in certain individuals placed in quite the same circumstances, colic, both speedily and in a severe form, without its being possible to distinguish the exact cause. One person may, after whole years of working, have one single attack of colic in the course of his life; another may be attacked at the end of some days or some months of the same species of work. One person has a slight attack; another, whenever he becomes ill, suffers to an extreme degree.

Returns.—Individuals who continued to be exposed, or are anew exposed, after recovery to the action of lead, are again attacked by the disease. Between these attacks the interval during which the patients have been exposed to the poisonous cause, varies. A first attack in this manner rather disposes to the occurrence of one or more subsequent attacks. Returns become so much the more frequent, that is to say, they approximate each other, according as the patient has experienced a greater number of attacks. The author observed that workmen who for eight, twelve, twenty-five years' employment in their occupation, had never suffered under this disease; yet if they were once attacked, from that time, they suffered attacks every five or six months; and some even suffered so severely that they were obliged to relinquish entirely their occupation.

One of the most potential causes of these frequent returns proceeds from the circumstance, that patients when scarcely cured leave the hospital, and work or reside in their workshops, amidst lead-vapours and floating dust. It is possible that the weakness of patients by reason of acute suffering, active treatment, restricted diet, may favour the absorption of lead, while the system presents less resisting power to the action of the mineral.

The author has seen patients who have had the sixth and seventh attack of colic; and in one case the disease had returned thirty-one times. Desbois de Rochefort, Doasan, Stoll, and M. Merat, saw persons who had been attacked by lead-colic, the sixteenth, the seventeenth, the twenty-second, the twenty-sixth, the twenty-eighth, and the thirty-second time. Among the twelve hundred and seventeen patients seen by M. Tanquerel des Planches, nine hundred and eighty-five had been, previous to the attack of colic which he observed, afflicted once or several times by abdominal lead-poisoning.

Relapses.—These must be distinguished from returns of the disease. When patients who have been to all appearance radically cured of the disease, without being again exposed to the contact and vapour of lead, are again attacked by symptoms of colic, this forms what is called a *Relapse*, in contradistinction to a Return of the Disease. The space which separates the apparent cure from the relapse is usually one or several days. The author refers to one or two cases (14 and 18) in which this interval amounted to years. Among all the patients in whom relapses of colic took place, he had ascertained the presence of one or more of those phenomena which shew that lead is still present in the organism. He therefore proposes the question, what is the manner in which this mysterious morbid manifestation is accomplished? What becomes of the poison while health continues, and what are the circumstances under which its action is anew induced? Is it to be supposed, that part of the poison has been eliminated by the influence of treatment, while the other part expelled from the spots in which it produced symptoms, begins to circulate once more with the mass of liquids, until, from some unknown cause, it again is fixed upon the abdominal organs and gives rise to characteristic phenomena?

Relapses, according to the observations of M. Tanquerel, take place in about one-twentieth of the patients. Most commonly they are brought on by errors in regimen, and even by treatment. Individuals who, from the day of recovery or the day after recovery, make use of full diet, are exposed to relapses. The safest course is to allow food only in limited quantities, and increasing by daily degrees. It is further a fact established by the author, that the greater part of methods of treatment, except that by emetics and purgatives, form the most common causes of relapses. Relapses are also sometimes observed to ensue, if emetic-purgative medicines are not given several days successively, even after the symptoms of colic have disappeared. Lastly, in a very small number of instances in which colic has been treated with activity and for a sufficient time, by these means, relapse nevertheless takes place. Upon the cause of this peculiarity no satisfactory information is communicated.

Stoll is of opinion that a purgative or an emetic given unseasonably is a ready and frequent cause of relapses. This, however, the author never saw; and he infers, from extensive experience, that this practice is the best prophylactic against relapses.

It seldom happens that each individual undergoes more than one relapse. The author saw, however, an old house-painter who experienced annually one or more relapses for the space of seven years. This man, during the whole of this period, was not in contact with lead or its emanations. He had given up his occupation of house-painter and become machinist at the Opera.

Some writers have spoken of epidemic lead-colics. Such an appellation is misapplied, and can only be given to this disorder when it prevails extensively in localities where men work at lead on the large scale, as in mines, manufactories of white-lead, red-lead, &c. The same name has also been applied not very justly to those attacks of colic, which have taken place from the use of wines adulterated by litharge.

Animals, when they are exposed to the contact of lead particles, are liable to be attacked by colic in the same circumstances as the human race. Thus it is observed that cats, fowls, dogs, and horses, are all in suitable circumstances attacked by this disorder.

Borsieri and Stockhausen are among the first authors who have observed lead-diseases, and especially colic, among the lower classes of animals. Wilson made instructive observations upon the animals in the vicinity of the mines at Lead Hills, when attacked by lead-colic. He found that cows, horses, sheep, dogs, and even chickens, reared upon the pasture of the Lead Hills and their vicinity, were subject to this disease. Similar observations were made by Stokes. According to these authors, at the distance of some miles from the valley containing the mines, the animals are in good health. But if by accident they come to feed in the skirts of the valley, especially on the low places which are irrigated in the winter season by a stream which flows past the lead-mines, and the waters of which leave, in all probability, salts of lead, they are infallibly attacked by the disease.

In general all physicians who have had occasion to observe the health of persons occupied in large manufactories of lead, have observed colic in the animals kept within, or about these establishments. Animals particularly are attacked, when they turn over with their paws several days in succession, particles and crumbs of lead-dust, in order to lie down to roll on the ground, or to seek food.

In some manufactories of red-lead and white-lead, cats are kept, and, though fed on good fresh food, these animals contract the disease. These observations were witnessed both by the author and by M. Trousseau.

M. Tanquerel des Planches proposes the question, whether these animals evidently contract colic in all the circumstances now mentioned, by breathing and by swallowing air loaded with saturnine emanations ? The hair by which their skin is covered places a barrier almost insuperable to cutaneous absorption of lead.

Precursory Symptoms.—Most usually the characteristic symptoms of primary lead poisoning precede and announce more or less closely the appearance of lead-colic. Among the twelve hundred and seventeen patients, seven hundred and eighty-five presented before the occurrence of colic one or more of the symptoms which denote the action of lead upon the economy. This shews that, in a very large majority, when these signs appear, colic may at any time be apprehended to follow.

All the characters of primary lead-poisoning and colic are most usually manifested in those professions which expose men to the contact of a large amount of poisonous emanations. It follows, therefore, that the preliminary signs of colic are all the combined signs of primary lead-poisoning.

In many cases lead jaundice and the saccharine taste appear only one or more days before the appearance of colic. By this means the directors of large manufactories of lead, when they perceive that any one of their workmen acquires all at once a yellow, earthy complexion, recommend him forthwith to quit the work, persuaded as they are by daily experience, that he is very soon to be attacked by colic. The workmen themselves, when they become sensible for the first time of a sugary styptic taste, or if this sensation after being present becomes more distinctly marked, dread the approach of colic.

The appearance of the distemper is usually proclaimed beforehand by morbid abdominal and intestinal symptoms. A sense of weight at the epigastric region, dull, fleeting pains in other regions of the abdomen, aggravated especially after taking food; sometimes squeamishness, eructations, and borborygmi, failure and gradual abolition of appetite, with constipation, and an uneasy sense of distension, are among the symptoms most commonly denoting the incipient stage of the disorder. With the want of power to expel the contents of the intestines, the fæces are usually hard, globular, and of a blackish tint. The urine is expelled with difficulty and slight pain.

These symptoms are not so severe as to compel the patients to cease from working, which they may do in different cases for days or even a whole week. Sometimes, however, after these symptoms have continued a few hours, and in almost all cases after lasting from three to five days, the abdominal pains become both more intense and more continuous; the patient distressed by severe and uninterrupted pain with frequent tormina is obliged to desist from working. The affection may then be regarded as established.

This colic does not, in ordinary cases, at once attain a high degree of intensity. Such a result takes place about three times in one hundred cases, especially after a relapse has occurred. The previous moment the patient is unaware of any derangement in the performance of the digestive and urinary functions; all at once the symptoms of colic became manifest with violence, and forthwith oblige him to suspend his occupations.

Sometimes diarrhœa, speedily followed by constipation, indicates the appearance of the disease. This symptom, as a precursor, was observed by the author eighteen times. In the whole of these cases, the diarrhœa lasted from one to eight days, and immediately upon the appearance of all the other characteristic symptoms, it ceased, and returned not again. In several of the patients who presented diarrhœa as a precursor, the author ascertained that they had committed a debauch the evening immediately before, or the second evening previous to the appearance of symptoms.

In certain instances, before the manifestation of colic, the workman, from being cheerful, became morose and peevish;

his features were contracted. Every exertion became fatiguing. Sleep was short, disturbed, and unrefreshing. Two of the patients seen by the author felt an unwonted degree of cold, and transitory shivering, for several days which precede the establishment of the colic symptoms. These phenomena are most probably the effects of the presence of the poison in the blood, and circulating with that fluid.

In a certain proportion of cases, saturnine arthralgia or neuralgic pains of the limbs precede the advent of colic. This form of lead-poisoning the author observed, in one hundred and eighty-five instances, as a precursor of lead-colic.

Three times he saw palsy of the superior extremities, and in one case amaurosis precede the attack. Anaesthesia of the members and of the trunk might be regarded as a preliminary phenomenon to colic in two of his patients only.

It may be remembered that this form of loss of sight, with palsy of the extremities, was the disorder seen by Dr Alderson, in a few cases of the white-lead pickers at the lead-works at Hull.[1]

Lastly, in two instances, saturnine Enkephalopathy indicated its presence before the establishment of the symptoms of lead-colic.

The attack of the disease commenced during night in about one-third of the subjects, in whom it interrupted sleep. In a certain number of instances, the precursory symptoms are not manifested at night; nevertheless the complete development of colic was effected at this time. The author allows, however, that the patient may also be attacked in the midst of his occupations, or in any other circumstances, when he is taking food, drinking, or in bed.

It may be here observed, that the circumstance of attack during the night, is not peculiar to painter's colic, but connects itself with the fact, that a large proportion of disorders affecting the digestive organs make their attack during the nocturnal hours. Thus, not only common colic, cholera, sometimes diarrhœa, fits of sickness and vomiting, but such slight disorders as heart-burn, cardialgia, gastrodynia, all make their most frequent attacks during the hours assigned to rest, or sometime between eleven P.M. and two or three A.M. Whether it be that at, or about these hours the food has undergone such changes as tend to produce distension, irritation, and disorder in the enteric mucous membrane, or that the horizontal position allows the mass of food to press upon various organs which in the sitting and erect position are not compressed, or that the large organ of the liver, by change in its position, not only presses parts not previously pressed, but is itself brought into a situation less favourable for free circulation, it is a matter of observation that a much larger proportion of disorders of the digestive organs commence their attack during the hours of night, than during any other period of the nycthemeral revolution. Other causes than those now assigned may be in operation. But the fact now stated, we think, is so general that it will be admitted by every one, who has paid much attention to the periods, at which the symptoms of disease make their most usual appearance.

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[1] Med.-Chirurg. Transactions, volume twenty-second. Lond., 1839. P. 83. &c.

The actual symptoms of Painter's Colic are tolerably we known. The most important symptom, that which is never wanting, is pain, situate commonly in the umbilical region, less frequently in the epigastric or in the hypogastric region; still less frequently referred to the renal region, the hypochondrium, the flanks, the iliac fossae, the anus, the testes and their cords, and even the chest.

Among the twelve hundred and seventeen cases observed by the author, in reference to the seat of pain, he found that the disorder occupied exclusively the navel two hundred and two times; in one hundred and sixty-seven cases it was confined to the epigastrium; in one hundred and forty-nine patients it was referred to the hypogastrium only; in twenty-two instances the renal region alone was represented as the seat of the pain; and twelve persons referred their pain to the hypochondres, the flanks, or the iliac fossae.

Among five hundred and seventy-three individuals labouring under colic, the pain occupied at the same time several points of the abdomen in different degrees, but also in the same proportion of frequency. Thus the navel, then the epigastrium, the hypogastrium, &c., were found most frequently the simultaneous seat of pain.

In eighty-two cases only the pain was diffused all over the abdomen.

Among forty-five of the patients, the author ascertained that the *testes*, their cords, and the penis, were the seat of pain. Lastly, in nineteen cases he found that the abdominal pain was propagated to the chest.

In no case did he observe that the pain of colic followed exactly and completely the course of the colon.

In the instances in which the pains are simultaneous in several parts, almost always there is one point of the belly in which patients complain more and particularly, and the seat of which varies according to the observations made by

M. Tanquerel, according to the following numerical returns:—

	Instances.
The navel habitually the most painful region in . .	243
The epigastrium ,, ,, .	184
The hypogastrium ,, ,, . .	150
All the other spots of the belly, the renal region, the testes, &c.	90

It is manifest, that it is not in all instances possible to circumscribe and define the exact seat of pain; it then occupies the borders of two contiguous regions. In truth, if it be remembered that the different regions are, after all, only convenient external divisions, and do not correspond exactly to fixed boundaries of internal parts, it will be seen that this sort of distinction cannot always be made. Often it happens that the pain attacks only one portion of the regions now specified.

Though the sort of pain is most usually twisting, in many instances it is accompanied with other sensations, as tearing, shooting, burning, and even boring. In some few instances the pain is compared by the patients to a sense of constriction, or to the compression produced by a heavy weight pressing upon some part of the belly. In this last case the abdominal pains are ordinarily obtuse; and observe a course uniformly, or almost uniformly, continuous.

In all other cases the intensity, the excruciating nature of the pain, is so great, that it throws the patients into the greatest agitation. Then, however, it is not always the same; it becomes more acute in paroxysms, whether during the day or in the night.

If the accession of colic be very painful, the expression is altered, the features are pinched, the eyes hollow, dull, and death-like; while the patients utter piercing cries, frightful groans, sometimes a sort of bellowing, according to Stoll. It is needless to describe the attitudes and positions caused by this pain, or the means which patients employ to procure alleviation.

Remissions take place nevertheless. The patient ceases to writhe, to scream, to moan; and though exhausted and presenting distinct marks of great debility, he enjoys a little peace and quiet, complaining, however, of the sense of constriction or of weight.

The character of this pain is said, like that of ordinary colic, not to be aggravated by pressure; usually indeed it is diminished when the abdomen is compressed. It is not easy, however, always to obtain distinct evidence of the effect of pressure ; and much care should be exerted both in palpation and in exploration, in order to estimate correctly the effects of pressure.

If, for example, the observer press all of a sudden upon a limited point, the suffering is usually aggravated. If he compresses a large surface gently and gradually with the hand unfolded, in general the patient allows that the pain is alleviated, or at most not aggravated. In some cases again, compression with the fist or closed hand abates pain, while compression with the open palm increases it. It is important to recommend the patient, during this exploration, not to contract the abdominal muscles during exploration; because, if they are in a state of relaxation, either natural or by previously inflecting the lower extremities upon the pelvis, a certain amount of alleviation is produced by compression of the abdomen. Some patients derive relief from forcible pressure, while slight pressure aggravates suffering. More frequently on the converse, simple frictions induce diminution in pain, while by deep forcible pressure it is rendered more acute.

In those cases in which pressure is followed by increase of pain, this is not increased in a very marked degree. It is merely a slight aggravation. In those cases, even the patients, during the accession, lie most commonly upon the belly, which they press with the hands, which proves that the pain is not remarkably increased by these means.

In a very small number of instances of simple colic, open and regular, the pain is very remarkably aggravated, upon the slightest pressure, to a degree so great that the case might be taken for one of acute peritonitis. But all the other symptoms of lead-poisoning are present; and further, notwithstanding this pain so violent upon pressure, the patient lies sometimes upon the belly or upon the side during the exacerbations, From instant to instant, and from day to day, its intensity is increased or diminished by pressure.

M. Tanquerel did not remark, though this has been stated by some authors, that the belly was always sensible to pressure during the presence of tormina and fits of pain. On the contrary, he observed in general that the relief was more perceptible at the time of the exacerbations than during the remissions. When he adds that sometimes even the pain seemed to diminish upon pressure during exacerbations and increase during remissions, it is manifest that nothing determinate is attainable on this point.

Among the twelve hundred and seventeen cases of lead-colic, the author remarked that in seven hundred cases pressure afforded relief. In three hundred cases the act of pressure neither afforded relief nor caused aggravation. In one hundred and seventy-five cases the suffering was a little increased by pressure. In thirty-nine cases the increase of the pain was considerable; but in thirty-four patients this result was accounted for by the presence of a complication. This shews that in two-thirds of the cases pain is diminished. In about one-fourth neither diminution nor increase of suffering takes place. Lastly, nearly about one-sixth of these feel a little more pain; some only feel sufferings greatly more acute in consequence of pressure.

Constipation has been long known to be a symptom of colic so frequent as to be esteemed almost characteristic of the disorder. In a small proportion of cases, nevertheless, diarrhœa is observed. Among the twelve hundred and seventeen cases, in eleven hundred and forty the bowels were more or less obstinately constipated; in thirty-three the bowels were regularly evacuated; twenty-five had diarrhœa during the first two days of the disease; and nineteen had this symptom during the whole course of the disorder.

It might be believed that the individuals who laboured under diarrhœa were suffering under an attack of lead-colic, not simple but complicated. In thirty-one of these persons this was not the case; they presented only the other characteristic symptoms attending this form of lead poisoning; under the ordinary purgative treatment, the diarrhœa, as well as all the other symptoms, speedily disappeared. In three cases in which there was diarrhœa without complication, the pains were most excruciating.

Of the matters expelled, the first portions are in general, if not always, in small hardened scybalous masses, yellowish or black, similar to the droppings of the deer and goat. Each movement also produces only a scanty discharge.

Retraction, depression, and hardness of the abdomen is a symptom frequently observed in patients labouring under lead colic.

Among 1217 patients, in 649 the belly was retracted; in 445 it was neither bulky nor depressed; lastly, in 123, it was larger, more developed, more prominent than usual; but in no case was it observed to be tympanitic. These numerical results the author regards as conformable to those of daily experience.

Various authors have endeavoured to shew that in lead-colic, the intestinal tube is in a sort of convulsion or spasmodic contraction ; and in connection with this doctrine they have maintained, that the rectum or the lower part of the intestinal tube is in a state of convulsive contraction.

The author examined the rectum in a great many persons who were suffering under lead-colic ; and to avoid all source of error, he took care to make the same species of examination in patients who had no affection of the digestive passages.

In the instance of violent painter's colic, if it be wished at the moment of an accession of pain to introduce the index finger within the rectum, the observer encounters at first great difficulty in causing it to enter through the sphincter, which is in a state of contraction so forcible that the finger experiences a sensation of constriction and girding as if it were caught in a vice. At length, by pushing it with a little force, it overcomes the resistance made by the sphincter, and the finger is in the lower part of the rectum, the walls of which are approximated to each other. Some lines, and even one inch above, the finger finds still the opposite walls of the bowel almost touching each other, and it is then requisite to separate them by the finger, if it is desired to penetrate further. If the finger is kept thus fixed during several accessions of colic, the observer very distinctly perceives, at the instant of each accession, in the whole extent of the rectum, in contact with the finger, the same sensation of constriction and numbing, as at the level of the anus, though in a smaller degree. During remission, this sensation of constriction always continues, though it is much less forcible, and returns quickly more strongly during the accession. This alternation of constriction and slight relaxation, it is in general very easy to recognise in instances of violent colic; but in cases of little intensity, it is with difficulty observed.

The constriction of the anus and rectum, impedes, without completely preventing, the administration of *enemata*. The hospital attendants perceive that they are obliged to employ more force than with the other patients, when they require to cause *enemata* to enter the rectum of persons labouring under lead-colic. These remedies also are retained shorter time, and are more hastily discharged than in any other circumstances.

M. Tanquerel consequently regards it as a fact established by observation, that the anus and rectum in persons suffering under lead-colic are affected by a spasmodic constriction analogous to that which is called *cramp*.

Squeamishness is a very frequent symptom ; more so than vomiting, which, however, is always preceded by squeamishness. Squeamishness was observed in 908 patients.

Vomiting was observed four hundred and twelve times (412) in 1217 patients. This symptom appears to be associated with the seat of the colic, being in the epigastric region. Among 385 patients who had vomiting, pain more or less violent in the epigastrium was remarked ; eighty-eight persons (88) only had vomiting, without feeling any considerable uneasiness in the epigastrium ; but in these the vomiting was not in general very obstinate or very abundant. The author saw only a small number of cases of epigastric colic, that is, twenty-two, in which vomiting did not take place ; in these pain in the epigastric region was slight or moderate.

It is an opinion of M. Merat, that the attacks of vomiting are usually excited by the treatment. This opinion is at variance with the observations made by M. Tanquerel. Most frequently the fits of vomiting take place from the commencement of the disorder, so soon as some pains are felt. They usually soon cease,—at the end of one or two days, before treatment has been commenced. In a large proportion of those cases, the patients brought to the hospital are already rid of this symptom when they begin to receive medical treatment, which contributes to cause its cessation, and not to induce evacuations. In a certain number of cases the vomiting continues to the decline of the disorder. This is observed principally when the colic is seated in the epigastric region, and when pain is considerable.

In one sense the vomiting affords relief to the urgent symptoms of the disease ; for in all cases in which it has taken place, the pains, though not removed, are, in some degree, alleviated. The vomiting, however, is in a great degree the effect of the constipated state of the bowels, and is always most promptly and effectually removed, as the intestinal tube is made by any means to expel its contents. We say in a great degree ; for it is not ascertained, whether this symptom of vomiting be not in part the effect of the lead-poison acting on the alimentary canal and secretions.

The matters vomited are of a grass-green colour, or what is technically called porraceous, that is leek-green ; (*porrum*) ; viscid in consistence, of a very fetid odour, quite peculiar, extremly bitter, aeruginous, which some patients say is analogous to lead, others to verd-de-gris, &c., according to the idea which they have formed of the substance which has caused their disorder. In none of the patients seen by M. Tanquerel did the matter vomited produce in the mouth the same sensation as a saccharine body.

Some patients, after making great retchings and rejecting a large quantity of bile, at first clear, then very thick, which deposits much at the bottom of the vessel, discharge at length a sanguinolent matter, which is mucus streaked with blood.

The Urinary Organs and Functions.—When the pain of colic is seated in the hypogastric or in the renal region, almost always the following functional changes in the state of the urinary passages are found.

In certain cases, during the paroxysm of colic, a painful sensation of constriction is felt near the neck of the bladder, and some difficulty is encountered in introducing the catheter within the organ. Scarcely has the paroxysm ceased, when the instrument enters with the greatest facility. The introduction of a catheter considerably aggravates the sufferings of the patient. The same individual who in the interval may have the instrument introduced with comparatively little uneasiness, has been thrown into a state of agitation almost convulsive, on the introduction of the instrument during the accession of a fit of pain.

Often enough the desire to void water is felt. Yet though the patient, in order to satisfy this necessity, makes great efforts, there is during the paroxysm either no excretion of urine, or it is expelled drop by drop. One of the patients of M. Tanquerel was up more than twenty times, day and night, to satisfy this feeling; he discharged only a few drops of urine. During the remission of the pain the urine comes away more freely. Sometimes it comes away all at once, after the patient has made unavailing efforts during a time more or less lengthened.

If at the time of an accession of pain the patient is making water, in certain cases a sudden interruption to the stream is observed. This symptom which was observed by Stoll and Dance, these authorities ascribed to a strong, instantaneous contraction of the urethra. What seems to confirm this opinion is the circumstance, that, at the moment of the stoppage of the stream of urine, the penis is sometimes observed to shrink, become very small, and almost wholly disappear; while some patients state that the penis is then constricted at its root, or through its whole length, as if by a cord.

In the canal of the urethra a sensation of heat and scalding, rather acute, make themselves to be felt, either before, during, or after the expulsion of urine. It is the same with the sense of constriction already mentioned.

Among the 1217 patients of M. Tanquerel the phenomena now noticed were observed separately or simultaneously 488 times. Almost always at the same time he established the fact of pain, more or less intense, in the hypogastric and renal regions. It is allowed, however, that in some instances of hypogastric and renal colic, alteration in the functions of the kidneys, the bladder, and the urethra, does not take place.

In the instances in which an impediment to the excretion of urine is observed, and the discharge is followed by pain, the liquid secreted is redder than in the normal state, only very rarely is it colourless. The urine was mixed with a great quantity of rosacic acid in seven patients. In only two cases was it alkaline, and in these there was no other disorder to which the alkaline state could be ascribed. The pain was seated in the hypogastrium and the renal region, and there was dysuria. Upon the cessation of the disorder the urine became acid. Among all the other patients the urine was not more acid than before the attack of the disease. M. Tanquerel did not remark that the scalding in the urethra corresponded with a greater degree of acidity in the urine.

In none of the cases was there observed any sediment independent of some complication. The representations of authors on the frequency of red sediments, M. Tanquerel regards as not founded on correct observation.

If these facts be correct, it follows that the peculiar sensation and the spasmodic contractions in the urinary passages in painter's colic, are not in any way connected with states of the urine, as they are in gastric and simple renal and urinary disorders. They must therefore be connected with the peculiar effects which the presence of lead in the system produces upon the tissues, mucous and muscular, of the urinary passages. The action of the poison, though upon all parts, seems however to produce its most sensible morbid effects upon the muscular tissue.

Organs and Functions of Reproduction.—It unquestionably shews the general, the universal dominion of the cause of this disorder in the economy, that, in a certain proportion of cases of lead-colic, the testes, the spermatic cord, the penis, the womb, the vagina, and the breasts, may be the seat of the characteristic pains. These pains give rise to sensations of drawing, of tearing, or of constriction.

Most frequently pain affects both testes at once ; very seldom is only one affected, though it is not uncommon for one to be more painful than the other. Usually, when the pain is severe, the organs are retracted towards the groin at the moment of exacerbation. This pain is observed to be diminished by pressure and support. The scrotum is corrugated at the time of exacerbation, and becomes relaxed during remission.

In two women labouring under lead-colic, pain was felt towards the vagina and the womb. One of them compared the suffering to that of childbearing. The author confirms the observation of former physicians, that amenorrhœa and sterility may ensue upon an attack of lead-colic.

Respiration is not in all instances, or in a great degree disturbed. A sense of constriction round the chest, and at the præcordial region, is a complaint not unusual, and pains are felt in various regions of the chest. But all indicate functional disorder only; and they seem, from the account of the author, as well as from other sources, to be referable originally to the abdominal suffering. Most usually, respiration is rendered more rapid than the normal rate, though only temporarily during the presence of the abdominal and intestinal pains. During the remission, the respiratory movements become slow, so that often they are at their normal rate. On the other hand, the author states that he has numbered to the amount of sixty and seventy inspirations in some cases of colic. It seems manifest that this frequency is the result of instinctive efforts to diminish the extent of the inspiratory movements. This seems to be confirmed by another statement made by the author. This is, that, in some cases, the movements of inspiration are not only lessened; they are incomplete, laboured, noisy, suspirious. The patient complains of a sensation of stifling, and even of suffocation. It is remarked that the thoracic cavity is dilated with effort in all its dimensions, while the abdominal parietes are very tense, and are scarcely raised. In other instances, when respiration is embarrassed, the movements of the lungs and of the diaphragm appear to be constrained; for the patients dilate the abdomen by arching the abdominal parietes, in order to facilitate the movements of respiration. Some authors, among others Ilsmann, think that respiration is occasionally rendered difficult by convulsions of the diaphragm. This hypothesis has given rise to the admission of a species of convulsive asthma caused by the action of lead.

Lastly, some patients have palpitations, short fatiguing cough, and symptoms analogous to those of *angina pectoris*. In one case, with symptoms of this description, the patient had from thirty-five to forty inspirations in the minute.

The voice is rendered feeble, interrupted, and panting; and some patients feel it requisite to speak in a low whispering tone.

Jaundice.—M. Tanquerel saw jaundice take place amidst severe sufferings in fifty-one instances, without being followed by any amendment in the symptoms. This was not the lead-jaundice noticed in the former volume, proceeding from alteration of the blood by the presence of lead. It was jaundice from extravasation of bile from its habitual receptacles, and diffusion of its colouring principle through the liquids and solids of the organism. This simple jaundice, which the author calls *nervous*, but which might more justly be denominated *Hepatic*, or *Hepato-Cystic*, corresponded in thirty-five instances with pains in the right hypochondriac region; in fifteen instances with pains in the epigastric region; and in four instances the suffering extended not to these two abdominal regions.

Circulation.—The movements of the organs of circulation are either not quickened, or they preserve their normal rhythm amidst the most excruciating suffering, and the most restless agitation. Among the whole number of 1217 patients, 678 presented the pulse beating from thirty to sixty times in the minute; 376 persons presented, in the same time, from sixty-five to seventy pulsations; lastly, in 125 of these patients, he counted from eighty to one hundred beats in the minute, though there was no inflammatory complication, nor concomitant organic lesion. In 38 patients the acceleration of the beats was accounted for by the presence of inflammatory or other complications.

The pulse is not so frequently retarded during the first days as towards the middle of the disorder. Occasionally the pulse rises above the normal rate after the administration of purgative treatment.

Hardness of the pulse, such as is observed in no other disorder, takes place in more than one-half of the persons attacked by lead-colic. Stoll likens the arterial pulsations to very tense iron wire, striking the finger by a uniform slow, vibrating movement. According to this physician, when the pulse recovers its normal frequency and pliancy, it is a sign that the patient is convalescent, and that relapses are not to be dreaded. The author confirms this remark in a certain number of cases. But it is the result of his observation, that it is not free from exception.

Among 269 patients, the pulse was found irregular, remittent as it were. For a few seconds the pulsations follow each other with great rapidity ; then all at once they become slow ; and so on in succession. In 22 instances the dikrotous pulse or double beat was observed ; in five instances an undulatory pulse. When the pulse is irregular, usually it is not hard ; most commonly it beats from sixty to eighty times in the minute, not usually is it retarded. This state of the pulse commences, as might be expected, with various disturbed states of respiration.

All these states of the pulse disappear as the symptoms of colic disappear, or a few days after ; and no trace is found of change in the valves and apertures of the heart, or of inflammation, which might account for these symptoms of disorder. Nothing, in short, in the condition of the patient, excluding the poisonous influence of lead, has been adequate to afford any explanation of them.

In twenty-nine of the patients who had lost blood, the pulse presented the same characters after the evacuation ; namely, hardness, slowness, and irregularity. This, he remarks, proves that the presence of lead exerts a specific action upon the circulation.

In some cases the patient feels, and the physician recognises, beating of the aorta at the epigastric region more or less forcible. These violent pulsations are continued to the navel.

In thirteen instances of lead-colic, in which epistaxis took place, this discharge did not change the intensity and the character of the poisonous disorder.

The clot is not usually covered by buffy coat. The serum presents no perceptible lesion.

There is little change in temperature of the person, either to the feeling of the patient or estimable by instruments. There is no shivering properly so called, though the nervous and muscular agitation which often attends exacerbations, is liable to be mistaken for this.

The author distinguishes four varieties, according as one region is more affected by pain than another, namely, umbilical colic, epigastric colic, hypogastric colic, and renal colic ; as to degree they are slight, moderate, violent ; and as to duration they are acute and chronic.

The disease may also be complicated with other affections, principally those of the alimentary canal ; for instance, gastritis, enteritis, dysentery, peritonitis, bilious fever, and typhoid fever.

On the progress and duration of colic the author has endeavoured to form some conclusions, which, though not exact, may be serviceable to others. Much evidently depends upon the intensity of the symptoms, and whether treatment is soon employed or deferred, or entirely neglected.

1. When persons who have been attacked by the disease are still able, in consequence of the mildness of the symptoms, to continue working amidst the circumstances which have caused these symptoms, the disorder may last indefinitely, if not opposed by any treatment. Individuals thus continue unwell for whole years. Sometimes, however, though very rarely, the colic disappears spontaneously in the course of some days.

2. While the patients cease to work different results may follow.

In the case of lead-colic left to itself, or to what are called the efforts of nature, it is most commonly impossible to fix the duration of the disease. In ordinary circumstances it continues twelve days, fifteen days, months, entire years, or indefinitely. In a small number of instances it disappears spontaneously at the end of two days, three days, seven days, eight days. When the disease is violent, its duration is in general more lengthened then when it is moderate and slight.

3. Most frequently, when the physician is called to treat a case of lead-colic, the patient has already been suffering for several days under this excruciating disease. We shall state therefore the average duration of colic, proceeding from the day on which treatment has been commenced.

There are several methods of treatment under which it is said that patients are certainly cured of colic, that is to say, the duration of the disease is abridged. The author is of opinion, that the course of the disease is often a little shortened, when treatment is employed, whatever be the nature of that treatment. But the question arises whether this slight abridgment of the disease ought to be ascribed to the direct action effected by these remedies, or to the influence which they exert upon the imagination of the patients.

One method of treatment alone, he thinks, almost uniformly abridges in a manner perfectly well marked the duration of the distemper. This is the employment, daily repeated, of drastic purgatives. He afterwards proves that under this method actively pursued, the disease usually lasts only from three to four days, counting from the moment at which treatment has been employed. To this rule he allows that there are some exceptions;—exceptions depending sometimes on the form of the colic, sometimes on the idiosyncracy of the individual. Most commonly when this treatment is adopted, it is possible to cut short the disease, when it is in its commencement, in its precursory symptoms.

It is long since the efficacy of this method of treatment has been known to English physicians. Fully fifty years ago, this method was adopted boldly, and successfully pursued, in this city; and we believe that we do not exaggerate when we say, that in all situations in Great Britain where the disease was liable to arise, the efficacy of purgative medicines was so well established, that no judicious physician had confidence in any other measures, and no good practitioner neglected to administer them until the bowels were fully and efficiently opened.

The Diagnosis cannot be said in general to be a matter of difficulty when adequate attention is given to the history of the case, its antecedents, and its actual symptoms. Lead-colic is altogether unlike any other disease of the abdomen. It is an affection stamped by a physiognomy quite peculiar. Though some of its symptoms resemble the symptoms of other disorders, yet when the whole assemblage is contemplated, when their connection, and their progress are considered, it is easy to distinguish the malady from every other affection of the abdominal organs. It seems extraordinary, therefore, when the author states, that at Paris, the majority of practical physicians are unable to recognise the presence of lead-colic, and that they mistake it for inflammation of the digestive organs, for ileus, for hernia.

There are not more, so far as is at present known, than three metals, the effects of which upon the chylopoetic organs are liable to be mistaken for the effects of lead. These are copper, mercury, and arsenic. From the effects of all these metals, and their salts and oxides, it is easy to distinguish those of lead. The effects of copper and the cupreous salts, are the most likely to be mistaken for those of lead. But these effects are of a much more decidedly irritant character than the effects resulting from lead-colic. It is doubtless true, that in some individual symptoms, the effects of the copper salts approach to and most resemble those of the lead salts. But here it is requisite to have recourse to the rule of taking all the symptoms together, and observing carefully their progress and their connection. When this is done, diagnosis is in general not difficult.

The only case in which there can be any difficulty, is in those not very frequent instances of colic, with symptoms of little intensity, and not well marked, which take place in the persons of workmen engaged in operations and processes at the same time with copper and lead. In this case the moderate severity of the disorder, if other concomitant symptoms take not place, renders it, the author thinks, of less moment, whether the symptoms arise from the action of copper or of lead. This can scarcely be called a good argument or a sufficient reason. It virtually admits the difficulty, the impossibility of diagnosis. But it does not shew how the physician is to distinguish lead-colic from the irritant effects of the salts of copper.

Dubois, in his Thesis, describes a colic similar to that produced by the poisonous action of lead, and which he maintains was produced by the action of copper. The workmen of the well-known copper foundry of Ville-Dieu-les-Poeles, in Normandy, were represented by Dubois as suffering under all the symptoms of lead colic. But only one thing was wanting to the accuracy, the fidelity of the narrative of Dubois. This is truth. The author had not visited the establishment; had he done so, he would have seen that the workmen subject to saturnine colic, are those only who were working with lead.[1] Of the accuracy of this M. Tanquerel was assured by M. Havard, the descendant of M. Dubois, who addressed to him several instructive letters upon this subject.

It is scarcely possible for the most careless observer to mistake the effects of lead for those of either mercury or arsenic.

There is another tribe or family of maladies, between which and lead-colic it is not in all cases so easy to establish a correct diagnosis. In certain districts of different European countries, in Poitou in France, at Madrid in Spain, the author adds Devonshire in England, and in various places in the East and West Indies, there prevails an affection of the intestines, a species of colic, which has by some been represented to be the same as lead-colic; which certainly is attended by very similar symptoms; but the existence of which it has not always, not even often and unequivocally, been possible to trace to the action of lead.

These colics being produced according to some authors by the use of the vegetables and fruits which grow in these countries, have been therefore denominated *vegetable* colics, in contradistinction to those attacks which were known to be induced by the ingestion of mineral substances into the organism, and which were usually and briefly designated as

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[1] See the Head Causes, at p. 153 of Volume First of the Work of M. Tanquerel des Planches.

metallic colics. Probably this may seem to be a *petitio principii vel quæstionis*,—an assumption of distinction as if from a presumed difference of cause. To this it must be replied, that it by no means follows from the fact, that lead-poisoning gives rise to colic, that therefore all colics originate from the action of that mineral. There may be colics arising from different causes entirely, colics, in the symptoms of which, though not in any way connected with the action of lead, it may be difficult to trace any very marked distinction. This is the state of the matter in this stage of the inquiry; and the question comes to be, are there really colics arising from other causes unconnected with the action of lead upon the economy, and yet which bear a certain resemblance to the symptoms produced by the action of that pernicious metal?

The colics which the author regards as of vegetable origin are the Entripado of Madrid, the endemial colic of Normandy, the colic in the West India Islands, and that of Cayenne and Surinam.

The Entripado of Madrid is a subject fertile in doubt and controversy. It may be first remarked, that M. Tanquerel des Planches, after giving an account of the symptoms of the Madrid colic from the best authorities, allows that it is evident, that there is the closest analogy, yea, the most complete resemblance, between this disorder and the lead-colic. But next comes the question, does the Entripado arise from the same causes; and if not what are the causes from which it arises? The Spanish physicians, as Luzuriaga, Hernandez, and others, regard it as produced by the preparations of lead employed in the bad tinning of the kitchen utensils, by the glazing of earthen ware, called *Tinajas*, and by the sophistication of wines and liquors.

All this the French physicians on the other hand deny. They maintain that the tinning of pots, pans, and kettles, is quite as good and perfect in Madrid as it is in Paris, in so far as the persons who pursue this species of industry in Madrid are almost all French. They state that the Tinajas employed in containing wine, vinegar, oil, and all sorts of alimentary articles are not glazed with any coating which contains lead; and as to the sophistication of wine by means of litharge, the French military physicians satisfied themselves that it is very rare, that this fraud is accomplished by means of litharge; because, they add, the wines of Spain are pleasant, agreeable, rich in generous principles, and pass not easily to the acid fermentation. It is easy to see that this last statement is not an argument against the use of litharge, but is merely equivalent to saying that these wines do not require this species of dulcification. Whatever any given growth of wines may require or may not require, it is difficult to say. But it is not difficult to say, that the rapacity and dishonesty of wine-makers and wine-merchants have repeatedly led them to sophisticate wines, not only in Madrid, but in every capital in Europe. The argument, in truth, goes for nothing. But while it is impossible, looking to facts, to form any other conclusion; we believe that there is evidence to shew that it is not impossible that the Entripado of Madrid may originate in causes altogether unconnected with the poisonous operation of lead.

It is the opinion of the French physicians, as Thierry, Larrey, Marquand, Morthereux, and others, that the colic of Madrid is owing to the use of ices, of fruits, of leguminous grains, often unseasonable, which are all consumed in an extraordinary degree; to the soil of this capital; and especially to the sudden and very great change in the temperature of the day and the night; in one word to chilling.

The physicians of Madrid already mentioned, Luzuriaga and Hernandez, will not admit the action of such causes as adequate to produce the Entripado. The disorders which result from the causes now specified, they argue, are quite different from colic. Those disorders, namely fevers, diarrhœas, with transitory intestinal pains, are, though more dangerous, never so obstinate as the Madrid colic; that the concomitant constipation never presents that character of obstinacy which is peculiar to metallic colics; lastly, that these disorders are never followed by palsy and other cerebral symptoms, and are not, like the Madrid colic, liable to relapses. They are, in short, decidedly of the opinion that it is painter's or lead colic.

To determine the point amidst this conflict of opinion, M. Tanquerel adduces the testimony of M. Alfaro, a Spanish physician educated in Paris. This testimony is in favour of the opinion of the French physicians and opposed to that of his own countrymen.

1. M. Alfaro thinks and allows that Drs Luzuriaga and Hernandez have described true lead-colic, as it is frequently seen at Madrid in the persons of individuals, workmen, especially house-painters, who are in contact with the preparations of lead. But it is a rare result of food prepared in badly tinned utensils or of the use of sophisticated wines.

2. Several causes contribute, according to M. Alfaro, in the capital of Spain, to the formation of the Phlegmasiæ of the abdomen, which are designated by the name of Madrid Colic. Promenades in the Prado and along the Canal, at the approach of night, under the influence of moisture, are

a powerful cause of derangements of the intestinal tube. The alleged colic of Madrid makes its appearance especially at the end of summer, and during the course of autumn. It is then owing to the use of ices, of fruits, and leguminous vegetables, often not in season, which are consumed to an abusive amount. Add to this, that the drinking waters of Madrid are often altered by the mixture of putrid waters which have already served for domestic purposes, especially during the time of intense heats ; and you will easily understand the direct and positive influence which all these causes must exert upon the abdominal disorders, which are generally confounded under the name of Colic of Madrid.

3. The anatomical lesions, so far as can be judged from the limited number of inspections performed with the usual conditions of accuracy, have brought to light no facts which would warrant the establishment of the Madrid colic as a distinct family in Nosology. These inspections have always shewn the characters proper to *Colitis*, to *Gastritis*, and to the other disorders above mentioned.

It appears from these statements that the great cause of the alleged prevalence of lead-colic or painter's colic at Madrid, is inaccuracy in diagnosis, that fertile source of errors in pathology and mistakes in practice. At the same time it must not be imagined, that the testimony of M. Alfaro proves that lead-colic does not, or cannot exist at Madrid. It merely shews, that it is not more frequent there than it is proportionally to the population, in Paris, London, Vienna, or any other large city. It is, in short, not endemial, nor epidemic. But this testimony also shews, that there are in operation in Madrid other circumstances which tend, with atmospherical peculiarities, to induce various disorders of the digestive organs, some of which imitate closely lead-colic, others are in no way connected with it except in affecting principally and primarily the intestinal tube and its appendages. These disorders may, if it is wished, be styled endemic ; but this impresses not upon them any peculiar or distinctive character. In point of fact, in all countries situate within the latitude of Spain, the summer and autumnal heat, with the heavy dews that fall in the evening, and the low temperature which takes place during the nocturnal hours, has a powerful tendency to induce not only fevers, but various affections of the alimentary canal in persons exposed and not very attentive to diet.

Regarding the alleged endemic colic of Devonshire, the author answers, as might be expected, lead-colic strictly so called is now unknown in Devonshire. It has indeed ceased since the use of lead vessels for the manufacture of cider has been relinquished. Any instances of colic that take place in that county consist of diarrhœa or dysentery, produced by the use of the tart and new ciders of the district, consumed in excessive amount.

Of the colic of Poitou (*Colica Pictonum*) M. Tanquerel des Planches disposes in a similar manner. At the present time no colic takes place in the province of Poitou, similar to the lead-colic, unless it is produced by the action of preparations of lead.

The colic of Normandy is a little more doubtful. Bonté, who describes this colic, believed it to be sometimes mineral, sometimes vegetable in origin. M. Tanquerel, however, who regards this description as a mixture of lead-colic and vegetable-colic symptoms, declines receiving it as a type for comparison with poisoning produced by preparations of lead. In order to throw some light upon the etiological relations of this colic, he adduces the authority of M. Vasse, an eminent physician at Rouen.

According to this observer, there occurs at Rouen and its vicinity a vegetable-colic, arising among persons addicted to the use of hard austere cider and perry. In this disorder, the belly is swelled and tympanitic like a braced drum; the pains are very acute, aggravated by pressure; these pains occupy the whole belly, and are not more severely felt at one part than another. When the pains are severe the patient writhes in bed or on the ground, inflects his body, and is in great torture for three or four days. There are no well-marked paroxysms. Sometimes the bowels are constipated; sometimes diarrhœa, like that of choleric patients, takes place; but rarely tenesmus and sanguinolent stools. Eructations, but no borborygmi, squeamishness and vomiting of porraceous matters; pains in the limbs; a little fever; livid or leaden colour of the face, and features pinched, constitute the other principal symptoms. The duration of this disorder is in general from eight to twelve days. It always yielded to treatment by Seidlitz water, bloodletting, or local bleeding from the anus, castor-oil in enema, and similar remedies, with opiates and diluents.

M. Vasse never observed a fatal termination unless in two instances; in which the persons, adults, had drank perry in large quantity. In these cases there were delirium, *subsultus tendinum*, torpor, convulsions, rigidity of the fingers, palsy of the lower extremities, followed by death some days after the attack.

M. Vasse maintains that he is never deceived as to the diagnosis of this form of vegetable-colic. "It has," he says, "no resemblance to gastritis, gastro-enteritis, peritonitis, cholera, &c. It is stamped with a peculiar character. Often, from the face of the patient, I have guessed the disease and its origin. Nevertheless, it may be easily mistaken for painter's colic, if beforehand the patient is not interrogated as to his profession. I have always considered this affection as essentially nervous."

Vegetable-colic is not very frequent at Rouen. It is chiefly observed during the months of October, November, December, and January.

Vegetable-colic prevails not as an epidemic. It attacks preferably men, and rather those of the destitute class. There is not a particle of lead in the construction of the presses, of the tubs, and of the tuns, which are employed in receiving the cider.

"The ciders of the district of Caux," continues M. Vasse, "do not induce vegetable-colic; they are not racked with litharge; while those of Low Normandy, which are sophisticated, cause the disorder. From having seen the difference between the action of the ciders of Low Normandy and those of the district of Caux, I have examined their composition and analysed them; and I have sometimes found litharge in the ciders sold at Champ de Foire." He concludes by stating his opinion, that, in the production of Normandy colic, preparations of lead have considerable influence; but that the ciders alone most frequently produce this effect.

This inference M. Tanquerel adopts only in part. It is admitted that individuals who drink ciders from Lower Normandy, where litharge is employed to remove their tartness, are attacked by vegetable-colic. But vegetable-colic, it appears, prevails where ciders, not treated by litharge, and containing no lead, are drank, To prove that cider, not sophisticated, may give rise to vegetable-colic, argues M. Tanquerel, it would be requisite to meet this disorder in individuals who have drank cider not mangonised, that is, not leaded; for instance, that of the country of Caux. Hitherto, continues M. Tanquerel, vegetable-colic has not yet been observed in these circumstances. He finally draws the conclusion, that the vegetable-colic of Normandy possesses points of resemblance to, and dissimilitude from, simple lead-colic, because it appears to be a union of an irritative state of the abdominal organs and lead-colic.

It appears to us that this conclusion can be applied only to the vegetable-colic of the drinkers of the Lower Normandy ciders.

On the subject of the vegetable-colic of the West Indies, that of Cayenne and Surinam, M. Tanquerel appears to entertain doubts; that is, he doubts whether the disease may not depend upon the action of lead introduced into the system by the use of wines and liquors; for he argues, while the disease as described by M. Chabaud and M. Segond, certainly bears a close resemblance to lead-colic, the latter merely asserts, but gives no chemical proof that the wines and liquors consumed were analysed.

There are many other disorders which may be mistaken for lead-colic, and for which lead-colic may be mistaken. Such are various neuralgic attacks in the abdominal organs; dysentery, colitis, peritonitis, hepatitis, hernia, ileus, and internal strangulation; vermination; constipation. But it is clear that ordinary care ought to be sufficient to enable the practitioner to guard against the mistake of confounding these disorders and one like painter's colic.

The Terminations and Prognosis we pass over, in order to proceed to the Pathology of Lead-Colic.

This has been a fertile subject of difference of opinion, if not of controversy. This it is not easy to avoid, for it appears to be inherent in the subject.

Many inspections of the bodies of persons destroyed under symptoms of lead-colic or soon after, have been made by Merat, Lerminier, Andral, Orfila, Chomel, Louis, Corbin, Grisolle, Martin Solon, and the author; and in these inspections almost every form of morbid and pseudo-morbid appearances found in all diseases of the alimentary canal, and in persons in whom death took place without symptoms of disease in these organs, has been found more or less frequently, and more or less distinctly. From a survey of the appearances found in forty-nine cases we give the following summary.

In twenty cases there was found in the digestive tube no alteration, or only some traces of congestion such as are observed in the most part of dead bodies examined, and in whom during life no functional lesion or disorder of the digestive passages had been recognised. In five instances, there were partial softenings without any other alteration, in the most dependent parts of the tube. There are further cadaveric changes, which are observed in an infinite number of subjects; that is, changes in colour, consistence, and other qualities which are common to many dead bodies, and which consequently cannot be recognised as proper to lead-colic. It may therefore be said, M. Tanquerel thinks, that in twenty-five inspections there was seen no anatomical lesion which had any relation with the symptoms observed during life.

In six instances, one-eighth of the whole number, the digestive canal was found thickened partially, or in its whole extent. This anatomical lesion is however one which is frequently met with in every kind of inspection.

Hypertrophy, or considerable development of the glands of Brunner, was observed in seven instances ; one-seventh of the whole number. The patches of Peyer also were found more than usually distinct in three of these inspections.

In cholera the same extraordinary development of the glandular apparatus of the intestinal canal has been remarked. This anatomical lesion, then, cannot be regarded as solely characteristic of lead-colic. In other respects we may consider it only as a consecutive lesion ; since it is not observed in all the cases of colic.

It may here be asked, is this not rather a preliminary lesion, as it is found in other instances besides cholera?

In sixteen instances, or one-third of the cases, an accumulation or a retraction of the intestinal mass was remarked. Leroux and Merat have explained the origin of this sinking or contraction of the intestinal convolutions by ascribing it to contraction of the intestinal parietes. This interpretation M. Tanquerel pronounces to be quite hypothetical, for the reason, that he found slight pulling or insufflation, was sufficient to cause the disappearance of this diminution of the calibre of the intestinal canal.

This condition of the intestinal convolutions, however, the author regards as one of the characters of lead-colic ; for the reason, that he found it in no other disease so well marked. This accumulation or heaping of the intestinal convolutions, nevertheless, was remarked in only one-third of the cases inspected. This circumstance, he thinks, proves that it is only one of the effects of colic, and not the cause of the symptoms observed during life. It may then be wanting in a considerable number of cases ; for it is known, that anatomical lesions, which are the effects and not the causes of disease, are not uniformly present.

The same remark is applicable to the four inspections in which the intestinal mucous membrane was found covered by a layer of thick mucus, as if coagulated, which kept in a state of adherent the fecal contents of the large intestine. This lesion, he adds, can be regarded only as the effect and not the anatomical cause, of the disease.

Lastly, the considerable development of the ganglions of the great Sympathetic Nerve, which has been somewhat spoken of, but the existence of which the author established in only one instance, must still be considered as an effect and not as an anatomical cause, of the phenomena present during life.

In all the inspections, the kidneys and the bladder were found nearly in the normal state; for some vascular arborizations do not constitute in these organs a morbid state. In the two instances in which M. Tanquerel found a considerable accumulation of the intestinal convolutions, the bladder appeared also to be contracted and shrunk, and its volume was very small.

From all these investigations M. Tanquerel draws the conclusion, that it is competent for him to affirm that there are no anatomical alterations, perceptible to the senses, which give rise to all the pathological phenomena of lead-colic, and that the material alterations which may be observed in the organs, are merely effects and not causes, of the symptoms observed during life.

A point in the Etiology of lead-colic, not unimportant, is to determine whether lead or its salts can be shewn to exist in solids or fluids of the body, in persons labouring under the disease. It might be imagined that it would be easy, by employing appropriate chemical researches and tests, to shew that lead or its salts exist in the blood, or in some of the solids. Scarcely, however, is any inquiry so difficult; and scarcely has any chemical investigation been hitherto so destitute of positive results.

Wilson, and afterwards Dubois, imagined that they beheld traces of the saturnine dust and powder in the intestinal tube. But subsequent researches have shewn that this is a mere piece of imagination. Orfila, after having performed multiplied experiments upon living animals, proved that it was possible to perceive upon the mucous membrane of the stomach the lead preparations, which had been introduced as poison, and which had remained there too short a time to be absorbed. But the preparations were no longer visible, when the poison having remained long enough to be absorbed, for instance four days, and to produce by reason of this absorption poisonous effects.

Merat was unsuccessful in finding traces of lead in the urine and in the excrements of those who were labouring under lead-colic in the wards of La Charité. MM. Tiedemann and Gmelin, on the other hand, state that, after having made several dogs swallow sugar-of-lead, they found proofs of the presence of this salt in the mesaraic veins, and in the splenic vein. From this statement M. Tanquerel is disposed to believe that it must be possible to recognise the presence of lead in the blood of individuals suffering under symptoms of lead-colic. To determine whether this idea was or was not well founded, he gave, on the 19th of June 1835, to M. Chevalier, two vessels containing blood, taken from the inferior *vena cava*, and the right side of the heart, and from the inferior part of the portal vein, of a man who died the previous day, after having laboured under symptoms of lead-colic and Enkephalopathy. After analysis with all care, M. Chevalier could recognise neither trace of lead, nor of the oxide of lead. M. Tanquerel himself was equally unsuccessful in finding lead in the urine of twelve patients suffering under colic, in which he made this investigation with great care.

It turns out, however, that all these negative results arise from imperfect and inadequate methods of research and experiment. M. Alphonse Devergie discovered, by the aid of incineration, traces of lead and copper in the intestinal canal of persons who had died from a cause unconnected with lead emanations; and in the analysis of various parts of the organs, the blood, and the excretions of a person destroyed by lead-colic, arthralgia, and Enkephalopathy, he readily discovered traces of lead and copper. In this instance the lead was found, as might be expected, in much larger amount than the copper. Both metals, however, were obtained, reduced to the metallic state. A curious difference between the two metals is, that the fecal matters contained a greater amount of copper, while the intestinal parietes furnished scarcely any. From the facts of this case M. Devergie deduces the inference, that there are strong reasons to believe that the large proportion of lead found in the intestinal tube, proceeded from the ingestion of lead into the economy, during the work in which this individual was occupied.

Judging from what has been long ascertained regarding the recognition of arsenic in the dead body, we should have thought that the part in which most probably distinct indications of the presence of lead would be most certainly and frequently found is the liver.

Astruc and Sauvages placed the seat of lead-colic in the spinal marrow; applying therefore to the disease the nosological denomination of Rachialgia. But it is known at present, says M. Tanquerel des Planches, that to this nervous centre belongs solely the function of transmitting or giving sensation and motion to the majority of the organs of the life of relation, and that alterations in it give use to no functional lesion in the organs contained within the abdominal cavity, excepting the bladder.

The hypothesis of Astruc, therefore, he concludes, is not admissible. Several modern authors, as Laennec, Barbier d'Amiens, Serres, and others, keeping in view the frequent presence of pains in the limbs in individuals suffering under lead-colic, have partly adopted the opinion of Astruc upon the supposed seat of colic. But the pains in the limbs produced by the action of lead, that is arthralgia, constitute a disease distinct from colic, and which has a different seat from the latter. This confusion of two distinct diseases has erroneously assigned for the seat of colic, that of arthralgia.

M. Giacomini places the seat of lead-colic in the abdominal muscles and the diaphragm, which contract, he says, spasmodically in this disease. This opinion M. Tanquerel pronounces to be most improbable, not to say more; and to have no merit but that of originality. The spasmodic state of abdominal muscles and diaphragm is indeed a mere effect, and only one of the many effects, and touches not the essence of the disease.

More probable and more plain is the hypothesis of M. Merat, who thinks that lead colic consists in a specific palsy of the muscular tissue of the intestinal tube. It is upon the muscular membrane of the intestinal tube, this author remarks, that lead exerts its deleterious influence. The nervous system which is distributed to these muscles, partakes greatly in this affection; perhaps, he adds, and very probably, it is the nervous system which is primarily affected. "I am not far from thinking," he continues, "that in metallic colic, the intestinal tube is, as it were, paralysed." "Constipation is one consequence of the progressive constriction of the intestinal canal."

This doctrine M. Tanquerel des Planches pronounces to contain two contradictory opinions; *constriction* or contraction of a muscular tissue, and *palsy* or relaxation. He thinks therefore, that if there be palsy of the muscular coat of the intestines, there cannot co-exist at the same time, constriction, progressive contraction of the intestinal canal. He adduces various arguments to prove that it is quite an erroneous idea to represent the nature of lead-colic to consist in palsy of the intestine.

M. Tanquerel, we think, is so far right in denying that the disease consists in, or partakes of, palsy of the intestinal muscular coat. But we think it is a matter of doubt whether there be not spasmodic action of the intestinal muscular coat; because many of the phenomena of the disease point to this condition.

The opinion of the author himself is, that lead-colic consists in a neuralgia of the Great Sympathetic. According as one phasis or another of this nerve becomes a sort of centre of poisonous excitability, from which proceed trains of irritation, any given form of colic appears. Thus when the cardiac, the mesenteric, the hypogastric, the renal plexuses, are the seat of neuralgic disorder, epigastric colic, umbilical, hypogastric, and renal colic, evince their presence. What proves that the organs are merely the terminal point of the pain proceeding from the Great Sympathetic, is the fact, that when the pain is slight, and even in certain cases when it is violent, there are no functional disorders of the abdominal organs corresponding to the point where the pain makes its appearance. If the viscera, argues M. Tanquerel, were directly affected by the poison, when the pain is seated in the point which they occupy, their functions ought of necessity to be altered. In neuralgic disorders of the organs of animal life, the primary seat is placed in the nerve which is distributed to the pained parts, and not in the organ itself; for instance, the skin, the muscles, the bones, &c.

Neuralgia of the great sympathetic nerve, he concludes, produced by the action of lead upon this part of the nervous system, ought not to be classed with ordinary forms of neuralgia. It deserves a distinct place in the Nosological Table, for the reason that its cause stamps on the whole physiognomy an impression, which is not that of ordinary neuralgic disorders.

This opinion has been in some degree shared by modern observers; for instance, Andral, Grisolle, Ranque, and others. These authorities add, however, that the spinal cord is involved in the affection. M. Tanquerel thinks that in ordinary cases of lead-colic, pure and simple, this addition is gratuitous. No morbid phenomenon, he contends, reveals and indicates any lesion of the spinal nervous system. It is only in cases in which lead-colic coincides with palsy and neuralgic pains of the limbs produced in this manner by lead, that this twofold lesion of the Great Sympathetic and the spinal cord can be believed to exist.

In the views here given, it must be allowed that there is a considerable amount of probability; and, perhaps, this is the highest degree of evidence that can be expected to be obtained on this question. It must not be forgotten, nevertheless, that while it has been shewn, that lead is circulating with the blood and is conveyed to all the intestines and organs, perhaps in equal, or at least nearly equal amount, it is not easy to admit that one part is exclusively affected, while others are not. It may be, that the Great Sympathetic and the intestinal muscular coat feel the noxious impression of the lead sooner and more readily than other parts, and that, consequently, the overt symptoms of lead poisoning are more speedily demonstrated by the disorder of the intestinal tube. It may also be the case that the intestinal muscular coat is first affected by the deleterious action of lead, and that the morbid motions thence excited, propagate these impressions in a reflex direction to the Great Sympathetic and the Spinal Cord. Indeed, to us it appears that this idea will explain more easily and fully than any other, the various phenomena and the successive stages of the disease. Upon this, however, we must not dwell.

The author takes some pains to shew that the disease is not inflammatory. This seems almost a work of superogation; for it is manifest that the poisonous effects of lead, operating in a gradual manner, do not in ordinary circumstances give rise to inflammatory action.

The treatment which M. Tanquerel is led to adopt and recommend as most efficient is, that by the administration of emetics and purgatives either combined or alternated with each other.

He considers, nevertheless, the different methods that have been proposed at different times by different physicians, and explains the peculiar merits of each.

The chemical treatment proposed by MM. Chevalier and Rayer, consists in the administration of hydro-sulphuric and sulphuric lemonade. The first is generally attempted by the use of the natural sulphurous mineral waters of Bareges, Enghien, and similar places, or by the use of the artificial sulphuretted waters. The method seems not however to be very efficient.

Dr Mosely first, and after a long interval, M. Gendrin, recommended the use of sulphuric acid diluted in water, or what was called sulphuric lemonade, as a remedy for the cure of lead-colic.

M. Gendrin affirms that he cured twelve persons in from three to four days by the sulphuric lemonade, which he represents invariably to abate the pains, on the second day, sometimes even on the first, so as to enable patients to return to work speedily. The usual rate of exhibition is two scruples of the acid in two pounds of water, which is suitably sweetened. M. Gendrin afterwards stated that by this remedy he cured more than three hundred patients.[1]

This statement M. Tanquerel represents to be little better than a romance or piece of agreeable fiction. In the white-lead manufactory of Clichy, which M. Gendrin appears to have sometimes visited, in no case was the progress of the disease ever arrested by means of the sulphuric acid lemonade; in no case did it prevent the workmen from discontinuing their labours. Such is the testimony of the superintendents and the workmen of Clichy, and of the patients at La Charité, who had come from Clichy.

The statement even that M. Gendrin had cured more than three hundred patients by this means, he pronounces to be altogether contradicted by the records of the Cochin Hospital, of which M. Gendrin is physician. This number of patients would require to have been admitted there from 1832 to 1834. It appears, however, that during this period not more than seventy-six patients with lead-colic, coming from Clichy and other places, were received. Even if it be supposed that only one-half of the patients treated were enrolled in the Register, this would give not more than 152, which M. Tanquerel sagaciously remarks, is very far short of three hundred.

He finds, further, that after direct trials made with this medicine, by Andral, Dalmas, and Sandras, it was a most inert and useless remedy.

He shews that alum, that is sulphate of alumina and potassa, which has been used upon the same hypothesis, is equally useless and equally inadequate to cure the disease.

Mercury is of no service, unless when it acts as a purgative.

Nux vomica, which has been strongly recommended by M. Serres, has either no influence, or only very trifling influence upon the disease.

Antiphlogistic measures have no specific effect. They are useful only when there are symptoms of inflammatory complication.

The merits of opium in curing this disease have been loudly and forcibly proclaimed by many physicians;—Citois, Tronchin, Dehaen, Stoll, Hillary, Payen, Luzuriaga, Adair, and others too numerous to mention. M. Tanquerel states shortly the results obtained by different practitioners down to Bricheteau, Martin Solon, and Filhos, all of whom employed hydrochlorate of morphia with apparent success. But from giving any opinion he refrains.

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[1] Dictionnaire de Medecine; 2d Edit., Tome viii., 1834.

M. Ranque, physician to the Hotel Dieu at Orleans, proposed not long ago to treat painter's colic by the use of narcotic stimulant epithems over the abdomen, a liniment containing sulphuric ether, and extract of belladonna, and belladonna in various other forms applied locally. The narcotic stimulant epithem is composed of hemlock, camphor, sulphur, tartrate of antimony, and gum-plaster. M. Tanquerel thinks that this method is too painful for patients to undergo it with equanimity in an hospital.

The revellent method by means of blisters applied over the belly or the thighs, presents no peculiar advantage to recommend its use. In a few cases it succeeds; but in many it entirely fails.

The treatment which has been long, and it is said successfully, pursued at the hospital of La Charité, consists in the exhibition of a great variety of medicines, prepared according to certain formulae, but of which the leading characters are purgative, or purgative-emetic.

So early as 1602, that is two hundred and fifty-one years back, there was employed at this hospital, according to the practice of two Italian monks, a compound called *Macaroni*, which was composed of one part of glass of antimony and two parts of sugar, the whole carefully mixed and reduced to a fine powder. Of this compound, one scruple was given as a dose three or four days in succession. This remedy is said to have been most efficacious in curing the symptoms of painter's colic.

Subsequently this treatment was much varied.

Sometimes an enema consisting of infusion of senna leaves with sulphate of soda, and a little antimonial wine, was administered on the first day of treatment; while in the evening an anodyne enema consisting of nut-oil, red-wine, and some opium, was exhibited.

On the second day tartrate of antimony in solution was given in moderate doses by the mouth; while decoction of guaiacum, sarza, and sassafras, was allowed in appropriate quantities. The anodyne enema was repeated at five in the afternoon.

The third day a sudorific ptisan with a purgative enema, followed by the anodyne enema, was administered; and at the hour of eight an opiate was given.

On the fourth day a purgative consisting of infusion of senna, Glauber's salt, jalap in powder, and some syrup was given.

In this way the patients were treated till the seventh day, after which usually, often long before, all the symptoms of the disease had vanished.

For a long time this was the practice pursued at La Charité. At present the practice is much the same, but simpler and more energetic. The method is essentially an alternate employment of purgatives and anodynes ; purgatives in the morning, and during the day with diluents ; anodynes at the evening, and about the hour of rest.

From the results given there is no doubt of the efficacy of the method.

Three hundred and forty-five of the patients seen by M. Tanquerel were subjected to this method. Of this number 110 were labouring under violent colic ; 135 under moderate colic ; and 100 under slight colic. Three hundred and eight (308) patients got quite well. The duration of the disease, counting from the day when treatment was commenced, was at a medium from six to seven days. Among the number seventeen had relapses ; twelve were affected by palsy, and seventeen by saturnine Enkephalopathy. Among the thirty-seven cases not cured, five died under symptoms of cerebral and spinal disorder produced by the lead ; seventeen were attacked by chronic colic, and fifteen by acute colic. These last were cured by the employment of other remedies, for instance, blisters, opiate medicines, Seidlitz water, and croton-oil.

During the first two days of this system of treatment, the patient vomits often, but has seldom movement of the bowels. The third day, in some cases, numerous alvine discharges take place with great relief. On the fourth day most commonly copious alvine evacuations of matters, generally scybalous, ensue ; and then all the other symptoms subside rapidly and remarkably.

There is no mystery in the effects of this method of treatment. The purpose and object are to procure relaxation of the bowels and the discharge of their contents. Whatever remedy does this, cures the disease. The author, nevertheless, speaks rather slightly of castor-oil as a remedy ; but he attaches great importance to the use of croton-oil. Epsom salts and Glauber's salt in solution, are quite as powerful as any other, if properly given. Indeed, the neutral salts in general, with vegetable and resinous purgatives, answer in general every purpose.

Here, however, for the present, we pause. It is scarcely necessary to speak in the common terms of commendation of this work, which, indeed, may be said to be above all praise.

It contains a large amount of information, well arranged, and in all respects most serviceable to the practitioner.

Before closing this article, it is due to Mr Bower Harrison to say, that the last work on the list is a greatly expanded form of the tract which that gentleman published in 1850. The chief object of the author is to point out the modes and channels by which lead and its salts may, imperceptibly and inadvertently, be introduced into the organism, and thus produce poisonous effects. Of this subject he has taken a greatly more extended view, and given more numerous illustrations than in his first publication; and we certainly think that he has produced a treatise which may be useful in directing the attention of many members of the profession to causes of disease not always suspected.

In a performance so useful it is unpleasant to be obliged to remark one or two inaccuracies, which would be better to have been avoided. We were not aware, till informed by Mr Harrison, that a review of the work of M. Tanquerel des Planches had appeared in the *Edinburgh Journal of Medicine.* (Preface, p. vii.) Is Mr Harrison certain of this fact? A review of this work appeared in the seventy-seventh volume of the *Edinburgh Medical and Surgical Journal;* and of this review the present article is a continuation,

Mr Harrison quotes the papers of Sir George Baker as having appeared in the *Medico-Chirurgical Transactions.* [See pp. 137, 172–176.] These papers are contained in the first three volumes of the *Medical Transactions of the Royal College of Physicians,* a publication which appeared between 1768 and 1785, nearly forty years before the *Medico-Chirurgical Transactions.*

In connection with this subject also, we feel it indispensable to say, in reference to the method proposed to refine sugar by means of acetate of lead, merely noticed at the close of last article; that whatever may be said by some chemists upon the alleged safety of the method, it is, nevertheless, fraught with the greatest danger, aud ought, on no account, to receive the sanction of Government, however plausible be the representations of the patentee. After acetate of lead has been employed for this purpose, though, viewing the matter merely in a chemical light, it may be asserted that the whole acetate of lead is got rid of; this is not the fact. After acetate of lead is mixed with any organic article or compound, it is next to impossible to effect separation. Even supposing that the lead may be rendered insoluble by the use of sulphuric acid, still a proportion of it will adhere mechanically to the sugar; and not only is there no security that it is all removed from the sugar, but there is a positive certainty that part of the lead, either in the form of oxide or in that of carbonate, will adhere mechanically to the sugar; and will thus become a most certain, though by no means suspected cause of lead-poisoning. The modes by which lead is introduced into the system above considered are incidental, in some sense not easily avoided, and not intended. The application of sugar-of-lead to the purification of sugar would be a deliberate, gratuitous, and systematic method of poisoning.

ART. II.—1. *The Diagnosis and Treatment of Eruptive Diseases of the Scalp.* By J. MOORE NELIGAN, M.D., M.R.I.A., Physician to Jervis Street Hospital; Lecturer on the Practice of Medicine in the Dublin School of Medicine, &c. Dublin, 1848, 12mo. Pp. 55.

2. *Eruptions on the Face, Head, and Hands; with the Latest Improvements in the Treatment of Diseases of the Skin. Illustrated with Coloured Plates.* By T. H. BURGESS, M.D., Editor and Translator of Cazenave's Manual of Diseases of the Skin. London, 1849. 8vo. Pp. 234.

3. *A Practical Treatise on Diseases of the Skin.* By J. MOORE NELIGAN, M.D., M.R.I.A., Honorary Fellow of the Society of Physicians of Sweden; Physician to Jervis Street Hospital; and Lecturer on the Practice of Medicine in the Dublin School of Medicine. Dublin, 1852. Post 8vo. Pp. 439.

In last volume we had occasion to direct attention to a Work on Cutaneous Diseases and their Treatment, by a physician of lengthened experience, great industry, and much knowledge of Materia Medica and Pharmacy. The strong points of the work of the late Dr Anthony Todd Thomson, were probably the number of illustrative cases, and the great number and variety of useful formulæ and prescriptions for medicines required in the general and local treatment of these diseases.

The present Treatise by Dr Moore Neligan, a physician also distinguished by his knowledge of Materia Medica and

Pharmacy, is upon a plan somewhat different, and possesses qualities of a different description to recommend itself to attention. Less extensive, and on some points probably not so ample, it presents in a condensed form excellent accounts of all the forms of Cutaneous disease, judicious views of their etiology and pathology, and the most recent and practical methods of treatment.

The author commences his work by taking, in an introductory chapter, a short view of the classifications of Willan, Alibert, Mr Erasmus Wilson, and Cazenave. Natural classifications, however, to which these last belong, he thinks not to be preferred to those which are denominated Artificial; *first,* because it is impossible always to fix on an invariable and uniform natural character; *secondly,* because the natural methods are complicated, and therefore not easily remembered. The artificial system, on the other hand, though not perfect, presents the advantage, that it is convenient for the purpose of obtaining and communicating a knowledge of the subject.

A classification of Cutaneous Diseases according to the regions of the skin which they principally and preferably affect, Dr Neligan allows to be possessed of advantages in the study of individual diseases. Upon this principle of what may be called Regional Distinction, Dr Neligan composed in 1848, the short Essay the title of which stands first at the head of this article. In this Essay the author confined his attention to five diseases, namely, four inflammatory; *Herpes Capitis, Ekzema Capitis, Impetigo Capitis, Pityriasis Capitis;* and one non-inflammatory, namely *Porrigo Capitis.* In the same manner he considered the diseases affecting the skin of the face in an Essay published in the eleventh volume of the Dublin Quarterly Journal of Medical Science, for 1851.

Upon the same principle, though upon a more extended plan, Dr Burgess takes a view of the eruptive disorders incident and proper to the face, head, and hands, and gives an elaborate, and to all appearance, a correct description of the several diseases appearing on the skin of these regions, and the peculiar characters by which they are distinguished.

It can scarcely be doubted that different regions of the skin possess peculiar and perhaps distinctive organic properties. It is known that the skin of the face is highly vascular; and that certain parts of it are well provided with follicles, while other parts contain in great abundance piliparous sacs and hair. The skin of the scalp also is peculiar, in being largely provided with piliferous sacs and hairs. It is quite natural to believe, that these and similar circumstances must impart a peculiar character to the cutaneous eruptions which take place on these two regions. It is, however, the exposed situation of these regions, and those of the hands, which, in the eyes of Dr Burgess, give the cutaneous diseases affecting them an unusual degree of importance, because they give rise, he says, to anxiety in the mind both of the patient and his medical adviser. It would be unjust to deny, that this is a reasonable ground for writing a separate Treatise on these diseases, which probably derive in some instances their existence, and in others a considerable degree of their peculiar characters from exposure. Probably, also, treatment requires to be modified when applied to the eruptive disorders of the head, face, and hands. Whatever view be taken, the work of Dr Burgess is well entitled to attention, from its full and minute details on these families of Cutaneous Disease. Dr Moore Neligan, indeed, also allows that the situation of eruptions on parts constantly exposed to the air, is an important ground of distinction from those which appear on parts protected by clothing.

The method which Dr Neligan regards as the most eligible, consists in dividing all the Cutaneous Diseases, properly so called, into the following Ten Orders :—

I. EXANTHEMATA.
II. VESICULAE.
III. PUSTULAE.
IV. PAPULAE.
V. SQUAMAE.
VI. HYPERTROPHIAE.
VII. HAEMORRHAGIAE.
VIII. MACULAE.
IX. CANCROIDES.
X. DERMATOPHYTAE.

To these he further adds two supplementary orders; SYPHILIDES or the eruptions taking place on persons suffering under the Syphilitic poison ; and the Diseases of the Appendages of the Skin.

The subdivisions are exhibited in the following Table ;—

I. EXANTHEMATA.
  Erythema.
  Erysipelas.
  Urticaria.
  Roseola.
II. VESICULAE.
  Eczema.
  Herpes.
  Pemphigus.
  Rupia.
  Scabies.
III. PUSTULAE.
  Acne.
  Impetigo.
  Ecthyma.
IV. PAPULAE.
  Lichen.
  Porrigo.
V. SQUAMAE.
  Psoriasis.
  Pityriasis.

VI. Hypertrophiae.
- Icthyosis.
- Molluscum.
- Stearrhœa.
- Elephantiasis.
- Verrucae.
- Clavus.
- Callositates.
- Condylomata.

VII. Hæmorrhagiae.
- Purpura.

VIII. Maculae.
- Vitiligo.
- Ephelis.
- *Albinoisimus.*

IX. Cancroides.
- Lupus.
- Kelois.

X. Dermatophytae.
- Porrigo.
- Sykosis.

XI. Supplementary Orders.
- Syphilides.
- Diseases of Cutaneous Appendages.

Various diseases in which an affection of the Skin forms a prominent part, but not the whole of the morbid condition of the system, Dr Neligan thinks not properly entitled to a place among the Diseases of the Skin now enumerated. These diseases, which are not met with in the British Islands, are the Yaws of the coast of Africa and South America, the author should have said the West India Islands, the Radesyge of Denmark, Jutland, and the Baltic coasts, and the Pellagra of Lombardy. He considers them, therefore, to have no better claim to be classed among Cutaneous Diseases than has the Plague, in consequence of its being attended with malignant pustules and boils. They are therefore entirely omitted.

We have no wish to find fault with this course, or to examine strictly the reasons assigned for it. If these reasons were to be examined, it would not be difficult to shew, that the argument operates in two ways. Among the diseases admitted as decided Cutaneous Affections by the author, there is scarcely one of which it might not be shewn, that the primary cause is deeply-seated in the system, and in other textures, besides the skin, and of which the cutaneous eruption constitutes only one part.

The plan of Dr Burgess does not require him to comprehend all Cutaneous Disorders. Yet as a large number affect the regions to the consideration of which he devotes his work, the number of disorders described is not small.

Under the Head of Eruptions affecting the Face, Dr Burgess considers, first, the Exanthematous; as Erythema and Roseola; second, the Vesicular; Herpes and Eczema; third, the Papular, Lichen; fourth, the Pustular, Impetigo, Acne, and Sycosis; fifth, the Scaly Pityriasis and Psoriasis; sixth, Lupus; and seventhly, the Syphilitic Eruptions.

The eruptions affecting the Head, that is the Scalp principally, are examined in the same manner; *first*, Vesicular Eruptions, Herpes and Eczema; *second*, Pustular Eruptions, Impetigo; *third*, Scaly Diseases, Pityriasis; *fourth*, Diseases attended with the formation of Parasitical Plants; Porrigo *Scutulata*, Porrigo *Lupinosa*; and, *fifthly*, Diseases affecting the Hair, Alopecia.

The eruptions affecting the Hands are considered in the following order; *first*, Exanthematous, Erythema *Papulatum; secondly*, Vesicular, Eczema; *thirdly*, Pustular Disease, Impetigo *Figurata; fourthly*, Papular, Lichen; *fifthly*, Scaly Diseases, Pityriasis *Palmaris*, Psoriasis *Palmaris et Dorsalis*, and Pellagra or Lombard Leprosy; and, *sixthly*, Disease attended with animal parasites, Scabies or Itch.

This it will be allowed is an extensive field for description, etiology, diagnosis, and treatment. Dr Burgess has bestowed much attention and care on the diseases considered in reference to the regions as now sketched; and his book is one which promises to be serviceable to the practitioner.

It is unnecessary to enter into detailed examination of these two works. We have perused both, we can say with interest, and we hope not without advantage. Both contain correct representations of those new views which have been recently brought forward on various cutaneous diseases, and especially those of the scalp.

The Ringworm or Scall-Head, (Porrigo,) and the eruption peculiar to the chin and the scalp called *Sycosis*, Dr Neligan has placed together under the name, it may be seen, of Dermatophytae, or Skin-Plants. In describing *Porrigo* or Ringworm, he gives from M. Robin a short description of the parasitical plant which is said to accompany, and according to Gruby and others, to cause the appearance of the disease; and the botanical characters are given from Schonlein. As the forms of this disease were fully, and we think correctly, given by M. P. H. Malmsten of Stockholm, in the seventy-third volume of this Journal, we shall satisfy ourselves by making this general reference for the benefit of readers who wish to study carefully the nature of this Cutaneous Disorder.

The common Ringworm of the Scalp, Dr Neligan regards, after the example of Cazenave as a Vesicular Disease; and he accordingly describes it by the names of *Herpes Circinnatus* and *Herpes Capitis*, under the head of the Vesicular Eruptions,

Dr Burgess describes ordinary Ringworm of the Scalp under the denomination of *Porrigo Scutulata* of Willan; and maintains decidedly, not its pustular character, but its peculiar nature in opposition to M. Cazenave, who classes it among vesicular eruptions. Dr Burgess also regards the disease as the result of a peculiar morbid condition of the hair follicles, in which the contained bulbs are partially involved. The seat of the disease, that is to say, is not primarily in the hair, but in the organs which secrete the hair; and the vegetable production which is so minutely described by Gruby, is a secondary product, he thinks, and not the disease itself.—(Pp. 176–177.) In short, Dr Burgess, though he allows that there is no doubt of the existence of the cryptogamous parasite in this form of Porrigo, does not admit that it is the origin of the disease. It is a secondary and adventitious product, as the *Sarkoptes* in *Scabies*, and the Mycoderma in *Favus*.

Favus, the *Porrigo lupinosa* or Honeycomb Scall of Willan, Dr Burgess in like manner regards as not caused, but only accompanied by the cryptogamous parasitical plant which appears in the pustules constituting the eruption. He further regards it as likely to be the result of chronic inflammation of the hair follicles, involving more or less completely the bulbs of the hair, and producing within the follicle instead of purulent matter, a peculiar heterologous secretion of a bright yellow colour and viscid consistence.

Dr Burgess consequently denies entirely the pustular character of both these eruptions; and considering them as both characterised by the presence of vegetable parasities, places them in a peculiar category by themselves. All the instances of *Porrigo* mentioned by Willan and Bateman may, he argues, either be referred to one or other of these two, or were mistaken for forms of Impetigo.

Upon the justice of these views we feel not competent to give any opinion. The idea that the parasitical plant merely co-exists with and does not cause the eruption, appears, we confess, exceedingly likely to be well-founded. It is well known that neither parasitical plants nor parasitical animals attack animal bodies in a state of health and vigour. It is only when animals get out of health and become feeble and sickly, that parasitical plants and animals find in them a proper habitation. Whether this is not the fact in the present instance must be left to be determined by subsequent observation. At all events we would recommend to the careful perusal and consideration of physicians the observations which Dr Burgess has made upon this subject.

In both works are given full instructions for the treatment of Cutaneous Disorders according to the most rational and scientific methods. In both works readers will be sure to find recommended, simple, efficient, and mild methods of treatment, to the exclusion of dangerous and painful ones, especially in the management of Diseases of the Scalp.

ART. III.—*General Pathology, as conducive to the establishment of Rational Principles for the Diagnosis and Treatment of Disease; a Course of Lectures delivered at St Thomas's Hospital, during the Summer Session of* 1850. By JOHN SIMON, F.R.S., One of the Surgical Staff of that Hospital, and Officer of Health to the City of London. London, 1850. 12mo. Pp. 288.

The series of Lectures contained in the present volume was originally made known to the public through the medium of the *Lancet.* The author has reproduced them in a collected form in the present volume, and as we are given to understand, with such further corrections and expansion, as the engagements of the author allowed him to make.

The Lectures are twelve in number; and treat successively of the following subjects.

In the First or Introductory Lecture, Mr Simon considers and explains the nature and objects of that department of Medical Science called Pathology, gives a general view of the Nature and Characters of Disease as distinguished from health, and impresses the importance of the knowledge of Pathology as the only means of improving the Treatment of Disease.

In the Second Lecture he takes a view of the blood as a subject or vehicle of disease, of its morbid susceptibilities and conditions, of its contamination by various new products, whether generated within the body as in the case of the heterologous growths and non-eliminated secretions, as carbonic acid, bile, urea; or introduced from without, as in the case of poisons; changes in its amount and in the quantities of its constituents in consequence of various discharges; and their relation to and effects upon different diseases.

In the Third Lecture Mr Simon takes a view of the subject of cell-growth in the blood; the serum and its salts; the relation of albumen to scrofulous and gouty deposits; extractive matters; fat; fibrin; and their relation to different morbid states and various products of diseased action.

In Lecture Fourth, on Quantitative Irregularities in the Distribution of the Blood, the subjects of local Hyperæmia, passive and active, are considered, including under the latter the theory of fluctuating and variable supplies of blood, and the circumstances by which they are influenced.

In Lecture Fifth, the subject of active Hyperæmia is continued and concluded; and the author proceeds to the allied subject of variations and irregularities in the process of Nutrition, including Hypertrophy, and its supposed causes, Atrophy and its causes, and Morbid changes in the Consistence of organs.

Lecture Sixth is devoted to four subjects: first Fibrinous effusions and their successive changes; secondly, the Generation of Cytoblasts; thirdly, their subsequent progress, with the subjects of suppuration in different tissues; and, fourthly, the Vascularity of New Tissues.

The Seventh and Eighth Lectures are employed in explaining the nature, the origin, and the pathological tendencies of Tumours of different kinds.

In the Seventh Lecture are considered the Tumours which affect, first, the Teguments, cutaneous and mucous; secondly, the Vascular system, arterial and venous; thirdly, Fatty Tumours; fourthly, Fibrous Tumours; fifthly, Cartilaginous Tumours; sixthly, Bony Tumours, simple and complicated; and, seventhly, Encysted Tumours, including follicular, vesicular, and bursal swellings; and Ovarian Cysts.

In the Eighth Lecture, the author gives a general view of the order of Tumours usually called Malignant and Heterologous, those growths which are known by the names of Enkephaloma or Cerebriform Cancer, Skirrhus or common hard Cancer, and Kolloma, Kolloid, or Gelatiniform Cancer.

In the Ninth Lecture, Mr Simon treats of the extensive and complicated subject of Scrofula and Tubercle, including the question of its hereditary transmission, Pulmonary Consumption, and the influence, real and supposed, of therapeutic agents.

Lecture Tenth contains a view of the extensive subject of Diseases of the Nervous System; and is concluded with observations on the effects of various agents, as cold, Belladonna, Strychnine, Tobacco, Chloroform, Opium, over the action and influence of the Nervous Centres.

Lecture Eleventh is Therapeutic, or at least Pathologico-Therapeutic; that is, it professes to consider the effect of Evacuant Medicines, and some other medicinal agents in relation to Humoral Pathology, and various morbid conditions connected with a real or supposed morbid state of the fluids.

The Twelfth Lecture, the last in the series, is devoted to the subject of Morbid Poisons, and their mode of operation; and the chapter is concluded with a summary of results as to the application of means of prevention and cure.

It will be seen that the subjects treated in these Lectures are difficult and complicated, and probably would have required to have been considered at greater length, and with a more ample and detailed amount of explanation. Mr Simon himself does not regard the expositions on all subjects as complete; and the work is remarkable rather as offering to the student short and condensed views of the various divisions of Pathology, and the best accepted doctrines on each, than as a perfect view of the whole science. It is due to Mr Simon to say, that he has within the limits of his work done everything which was practicable to present to the student just and correct views of the present state of pathological knowledge. For this purpose it may be deservedly recommended as an excellent condensed manual on the subject.

It is not our custom to enter into any details of the contents of a work like the present. But perhaps it may be useful to advert to a few of the many subjects treated by Mr Simon.

In speaking of the subject of Bony Tumours in the sixth section of the Seventh Lecture, Mr Simons mentions, on the authority of Rokitansky, the Professor of Pathological Anatomy at Vienna, a remarkable instance of bony deposit, in the membraniform manner, within the skulls of puerperal females. Rokitansky found that, within the calvaria of a considerable proportion of puerperal women examined by him at Vienna, there lay a fine lace-like deposit of porous new bone, adherent to and identified with the inner table. This deposit, where abundant, was sometimes distributed over the whole vault of the inner table, and it appeared in patches at the base; but it shewed a decided preference for the inner surfaces of the frontal and parietal bones, especially along the course of the longitudinal sinus, and most of all on those mammillated eminences which separate the impressions corresponding to the cerebral convolutions.

The early stages of this delicate osteophyte consist in simple exudation, followed by the formation of cartilage, a process similar to the formation of node in periostitis. Each new pregnancy tends to add another lamina to this growth; and where several layers of this kind have been formed, they are represented to be preserved, at least for a long time, distinct from each other by a species of interposed diploe; so that the aggregate of these bony laminæ may indicate, it is said, the number of times the female has been pregnant. (P. 128.)

Rather indistinctly it is said, in reference to the females in whom this deposit was observed, that they were in the puerperal and the pregnant state; and it is not mentioned whether the deposit is confined to the puerperal period, or is common to the whole time of pregnancy. From the term puerperal, however, being twice employed, it seems likely that the deposit has been hitherto remarked chiefly in puerperal females. If this be the case, it would be very desirable to know whether those women had died, or had been very unwell during the puerperal period; whether, in short, there be means of knowing, whether the morbid ossific action is associated with the natural puerperal state, or with some one of its morbid complications and incidents. Reasoning from analogy, it is not easy to suppose that a deposit of the kind now mentioned could have taken place, unless the cranial surface of the *dura mater* had been in a state of inflammatory orgasm. Should this have been the fact, another question arises,—were there symptoms during life indicating the presence of this inflammation, and what were those symptoms? It seems not necessarily a fatal affection, if it be true that there are indications of its having taken place during each time that the female was in the puerperal state. Another question arises, is this condition, which gives rise to this bony deposit, necessarily connected with the puerperal state? Does the cranium of every female who has been in that state present the deposit?

A specimen, shewing the deposit, which was presented to Mr Simon by Professor Rokitansky, is preserved in the museum at St Thomas's Hospital.

The account given of the Heterologous Growths, Enkephaloma, Skirrhus and Colloma, is conveyed in a correct and instructive manner. Mr Simon admits the general or constitutional character of these growths; and allows, that though removed from one spot in which they have appeared, there is not only no certainty that they can thus be eradicated from the system, but great certainty that they will reappear in another region and organ. The cancerous tumour, in short, he allows to be a mere symptom of constitutional disease, an external phenomenon or local manifestation, arising in a concentrated act of the whole system, as clearly as a fit of gout is the local product and evidence of a general disorder of the system.

Such being the case, it follows that all attempts at curing any of the cancerous tumours, by means of operation, are simply absurd, to speak in no harsher terms. The author however hints, that there may be instances of cancer, in which the indications of constitutional cachexia are not very strong, and in which operation may be resorted to. He allows, however, that by operation little is gained, unless the tumour be on the point of ulcerating.

To us it appears, that by operating under such circumstances, nothing is gained; and it would be well for the surgeon, and better for the patient, to refrain from operation.

If there be any use in pathological knowledge, one of its most obvious lessons is, that the whole tribe of Cancerous and Malignant Growths should not be meddled with in the way of operation. Everything that has been discovered regarding the structure and tendencies of these growths shews, that they ought to be let alone.

In the Eleventh Lecture, where Mr Simon treats of the effects of evacuant medicines in relation to Humoral Pathology, he begins by pronouncing some severe, though not undeserved criticisms, on the random method of ordering medicine, writing prescriptions, and combining several different ingredients, often chemically incompatible and medicinally antagonistic in the same formula. He expresses the opinion that notwithstanding all the traditional, and surely it must sometimes be allowed, the historical knowledge which is at present contained in works on Materia Medica, we possess not now, in the middle of the nineteenth century, a complete knowledge of any single article.in the Pharmacopœia.

We do not feel competent to controvert this statement, made on such authority. It is very likely, that Mr Simon may be in the right. Only, one point seems pretty clear, that medicine and medicinal combinations are often misapplied, often administered where they ought not to be administered; and that the smallest possible amount of judgment is frequently evinced in the selection and exhibition of drugs, and their compounds.

Mr Simon draws a contrast betweeen the knowledge, the experiments, and the proceedings of the chemist and the chemical physiologist, and those of the physician and the pharmacologist,—much to the disparagement of the latter. With the former he represents all to be accurate, precise, scientific, and consequently giving results upon which dependence may be placed. With the latter, on the other hand, everything is hap-hazard, accident, confusion, and disorder; no method, no system, no precision; and hence, he concludes, the results are either negative or totally different from those expected, if any expectation is formed at all. When we have given, he says, meadow-saffron to six patients suffering with gout, when it has relieved two and has left four unrelieved, we are quite unable to explain why it failed in the four cases and succeeded in the two; and consequently in that unsuccessful majority we are quite unable to supply the absent condition, whatever it may have been, which was accidentally present in the successful instances, and contributed to their cure.

In this instance it may be asked, what is the evidence that the meadow-saffron really contributed to the cure of the two favourable cases, more than it did or was doing to the four supposed unfavourable cases. Do cases of gout never get well of themselves? Many persons say they do; and several gouty persons know this so well that they take no medicine, and merely abstain from improper articles of food and drink.

Mr Simon subsequently proceeds to shew that all the specific properties and effects ascribed to certain orders of medicines, as emmenagogues, diuretics, sodorifics, cathartics, sialogogues, errhines, and expectorants, are a great delusion, and that under these names lie nothing but fancy and deception; that, in short, we possess little real or useful power over the organs of excretion. This doctrine is not new; and there is no doubt, that whatever distinctions a certain class of writers on Materia Medica and Therapeutics may have introduced, there is no such agent as a diuretic, emmenagogue, or expectorant properly and strictly hitherto known in the large and multiplied lists of the Materia Medica. All the agents classed under those heads stimulate, irritate, and excite the vessels and the fibres of all textures indiscriminately; and when they produce a diuretic effect, an emmenagogue or an expectorant effect, it is only from the general stimulus which they cause to the vessels of the system at large. Pure water is probably the only diuretic in nature; and it may be diuretic, diaphoretic, and even at times laxative.

According to Mr Simon, and the doctrine is now on the whole generally admitted, the activity of the excreting, it may be said the secreting, organs varies in proportion to the amount of blood traversing their capillary vessels; that is the kidneys and the liver secrete and excrete urine and bile according to the amount of blood going to the organs respectively. To increase the circulation of blood through an excreting organ, would therefore appear, infers Mr Simon, an easy method of augmenting its characteristic excretion.

Though abstractly speaking this may be true, it practically requires an important qualification. The blood excites in the several organs to which it is distributed, the power of excreting peculiar matters, because these matters are contained in the blood brought to the organ. Urea is the excitant of the kidneys, biliary matter and taurine of the liver, and cause these glands to eliminate their respective excrementitial articles. Hence, says Mr Simon, an increased excretion from any given gland can be produced only by presenting to that gland an increased amount of the specific article which excites the gland to action.

So far this seems sufficiently reasonable. There is merely one condition, or one mode of stating the condition, that to us appears to be fallacious. Secretion and excretion, says Mr Simon, from any given gland are in proportion to the amount of blood distributed to that gland. To this it must be answered, that if the amount of the blood exceeds the normal state, or if the blood be altered in quality, instead of increasing the secretion it diminishes it. The liver and kidneys we conceive, it can be proved, secrete bile and urine, not so much in proportion to the quantity of blood distributed to these organs, as in proportion to the perviousness of their vessels in relation to the amount and kind of blood, and in proportion to blood being capable by its chemical and mechanical properties of readily circulating through the vessels of both glands. The gouty patient, in whose vessels is circulating a large and abundant mass of blood, loaded with carbon, urea, and the matter of bile, secretes and excretes but small quantities of either bile or urine. Diminish the amount of solid food, make him live on bread and water, or take away a little blood, and the secretions are in no long time augmented. It is not by increasing either the proportion of biliary matter or that of urea, that either the hepatic or the urinary secretion is augmented. These substances and principles, and the principles from which they are formed, are within the system too large and too copious for its necessities, too abundant to be got rid of by the liver and kidneys of the individual. He cannot increase the power, any more than he can enlarge the size, of the liver and kidneys. But he may diminish the work which he gives them to do. These organs are in truth overworked; and the only rational way of increasing their secretions is to diminish the duty which they have to perform.

Notwithstanding the objections now made, which we conceive are obvious, Mr Simôn proceeds to say that all the power we possess of increasing, or appearing to increase individual excretions by means of medicines acting through the blood, consists in adding to the blood the ingredient of some one secretion or more ; and that this, by propelling and impelling a larger amount of blood to the organs, causes a larger proportion of the characteristic animal stimulus, and thereby increases the action of the kidneys. This cannot be denied, within certain limits, to be well-founded. But it seems extraordinary that a writer, who is so strenuous an advocate for the application of scientific physiology and pathology to the subject of the action of medicines, should not perceive that in this entire hypothesis of increasing the action of the glands, he actually admits the possession of a power as great and as distinctive as that of the most decided authorities on Materia Medica for the specific action of certain agents upon certain glands.

The conclusions which the author establishes are the following.

1. One organ can excrete for another only such materials as are common to both. All organs can excrete water, and perhaps certain salts, for one another. Thus far—*i. e.*, in respect of such materials as are common to both—one organ may be said in health to antagonise, or in disease to act vicariously for another, but no further. There may be a sanguineous derivation from one to another, but not a substitution of activity.

2. To a very limited extent, certain retained excretions may undergo in the blood a chemical change, which brings them within the means of appropriation of some other organ than that to which they specially belong ; thus, in the experiments I cited, urea for a time seemed to be excreted from the system by the mucous membrane of the stomach—not, indeed, as urea, but as carbonate of ammonia; thus, again, carbon and hydrogen, when incapable of passing off in their respective gaseous combinations, seem liable to be secreted as fat.

3. By means of drugs having special organic affinities—such as cubebs for the kidney, elaterium for the intestines, arsenic for the stomach—we are able almost indefinitely to produce and accelerate, in the excreting surfaces of the body, certain changes, which tend in each case to eliminate the particular drug with more or less aqueous exudation : but which fail to augment, or, at the utmost, only momentarily augment, the discharge of material specific to the surface. And,

4. As these accelerated molecular changes always involve the occurrence of artificial hyperæmia, so we may expect, and we do really find, that excretions thus abnormally excited will always contain evidence of the congestion we have induced, presenting (just like inflammatory effusions) the several grades of albuminous admixture, to which presently the fibrin of the blood, and subsequently its coloured

particles, are added in an increasing proportion. Under the influence *(e. g.)* of cholera or elaterium, there is set up along the mucous surface of the intestines, a condition of molecular excitement under the operation of which they first shed their mature epithelium; next, a profusion of unripe epithelial growth, giving the re-actions of albumen, and floated in a profusion of water; next, a fluid which constantly becomes more like the serum of the blood, contains flakes of coagulated fibrin, and often gives evidence of the rupture of capillary bloodvessels."—(Pp. 244, 245.)

In a subsequent part of this Lecture, Mr Simon expresses great doubts of the correctness of the doctrine regarding the mode in which saline solutions exert respectively their purgative effects on the one hand, and diuretic and diaphoretic effects on the other. To us it appears that he is rather hostile to this hypothesis, not on very strong grounds. No dilution, he says, of sulphate of magnesia prevents that salt from proving purgative, when given in sufficient quantity. The last condition is an important qualification; for, doubtless, if six drachms or one ounce of the salt be taken, in a sufficient quantity of water, in general it proves purgative. But if, on the other hand, one drachm in water be taken, this solution is certainly received by endosmosis, and passes through the different membranes to the kidneys, proving not purgative but diuretic. The case of nitre not being convertible by any amount of water into a purgative in ordinary circumstances, must be allowed.

We must not, however, dwell longer on these subjects. All we can do is to recommend the work of Mr Simon to all readers.

ART. IV.—*A System of Practical Surgery.* By WILLIAM FERGUSSON, F.R.S., Professor of Surgery in King's College, London; Surgeon to King's College Hospital; and Surgeon to His Royal Highness Prince Albert. Third Edition. London, 1852. Post 8vo, pp. 846.

This system of Practical Surgery was first published in 1842; and its merits were shortly noticed in the sixty-second volume of this Journal.[1] A second edition appeared in 1846; which was also favourably mentioned in volume sixty-seventh.[2] The present is the third edition: and it deserves to be known to the student of Surgery for the large amount of practical information which it contains.

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[1] Edinburgh Medical and Surgical Journal, volume sixty-third. January, 1845, p. 223.

[2] Ibid., volume sixty-seventh, p. 305. January, 1847.

The Work is principally a system of Practical and Operative Surgery; and to this subject Mr Fergusson mainly directs attention. In this point of view the work presents certain peculiarities which merit attention.

It is divided into five parts or general divisions.

The First Part is devoted to the general doctrines of Surgery; the use of instruments; and the explanation of the characters of those diseases and morbid states for which chiefly surgical assistance is required, in whatever part of the human body they take place. In this manner Mr Fergusson treats of Wounds and their effects; Inflammation and its consequences; Suppuration, Ulceration, and Gangrene; the question of Amputation in Gangrene; Hospital Gangrene; Rose; Boil, Carbuncle; Ulcers; Burns and Scalds; Chilblain and Frost-bite; Dislocations, Fractures and False Joint; Diseases of Bloodvessels; Tumours; Diseases of Bones; Diseases of Joints; and Amputation.

The Second Part is devoted to the Surgical Diseases of the Upper Extremity, and the operations performed for their cure or alleviation.

The Third Part is devoted to the Surgical Diseases and injuries incident to the Lower Extremity, and the operations required for their cure or alleviation.

In Part Fourth, the author treats of the Surgical Diseases and Injuries incident to the Head, Neck, Face, and Jaws.

In Part Fifth, which is devoted to the Surgical Diseases of the Chest, Abdomen, and Pelvis, the subjects examined are important and numerous. Dislocations, Fractures, Incisions rendered necessary; the Ligature of Arteries; Hernia and its appropriate Operations; Diseases of the Rectum, and the requisite Operations; Operations on the Scrotum, Testis, Fore-skin, and Penis; the Introduction of Instruments into the Urethra and Bladder; Stricture and Retention of Urine; and, finally, Stone, and its removal by Solution, by Lithotrity, and by Lithotomy, are the subjects considered in this last division of the Work.

One character, in a great degree peculiar to this work, is entitled to especial mention. At the beginning of each of the divisions of the work, excepting the first, Mr Fergusson gives a view of the Anatomy of the Region, as unfolded by Dissection. These views are given with great clearness, in a plain, easy manner, and exactly as they would be presented by a diligent and careful demonstration. Though not given as forming a complete system of Surgical Anatomy, they are nevertheless equivalent to this, and they may be safely and strongly recommended to the surgical student who has previously received a sufficient anatomical education, as quite sufficient to enable him to understand what may be called the anatomical principles of each surgical operation. To those who know how well qualified Mr Fergusson is, by his education, to be an able instructor on this subject, it will not appear singular when we say that these anatomical expositions may be regarded as one of the most serviceable parts of the Treatise.

Finally, the descriptions of the several diseases requiring surgical assistance are given with great clearness and accuracy, and the work is one which may justly be said to present a faithful view of the present state of Practical Surgery.

ART. V.—*The Dietetics of the Soul.* By ERNEST VON FEUCHTERSLEBEN, M.D. Edited from the Seventh Edition. London, 1852. 12mo. Pp. 202.

A beautiful, agreeable, and elevating doctrine it is to believe and to teach, that the soul has power over the body. It is only unfortunate that, if it be in some respects speculatively true, it is in by far the larger majority of instances, in which we desire to make the practical application, completely contradicted by daily experience. Some conditions of the human entity undoubtedly there are, in which the immaterial soul, and its faculties and emotions, seem to control certain acts and conditions of its corporeal mansion. Hope is one of the great powers by which a certain amount of this controlling power and supporting influence, appears often to be exerted. Confidence, assurance, the strong energetic will, are similar and kindred agents, which often enable the soul to aid and support the body, and to guide and direct its actions, advantageously for both. But the truth must be told; that in a very large, by far the largest proportion of instances, when the material frame is enfeebled and broken down by any lesion, slight or severe, in certain of its organs, the soul can do little more than breathe earnest though unavailing prayers and wishes; unless some effectual stop be put to the material evil, the vigour of the frame is gradually, but surely and irrecoverably undermined; and the spirit returns to God that gave it, leaving the corporeal mansion to be dissolved into dust and ashes.

No rational person denies the existence of the soul, and the influence of its faculties over the intellectual powers and the moral actions. But it is no imputation on the reason of any one to doubt the existence of the influence of these faculties upon the condition of the body;—to say, that if it in reality exist, we have little or no proof of its being so often and so regularly exerted, as to justify the belief in its influence. Surely a good authority informs us, that none, by taking thought, can add one cubit to his stature; and by parity of reason it may be said, that none by taking thought can either stop the approach, or effect the cure of any disease. Dr Feuchtersleben thinks differently; and in order to make his reasoning conclusive, he tells the reader, that any one that calls in question the truth of his doctrines, does the same as if he doubted the existence of the soul.

" Let him," he exhorts his reader, " who doubts whether he has a soul, lay this book aside.'' It is quite manifest that the author here confounds two propositions essentially distinct. The existence of the soul is one thing; its influence and power over states of the body, whether healthy or morbid, is a matter entirely different. Is it not possible to disentangle this confusion of ideas ?

By those powers which are admitted to prove the existence of the soul, man is connected with the past world and with that which is to come. By the conscious possession of these powers, he feels that he is a moral agent, responsible for his conduct and all his actions. He is made at the same time to feel his own weakness, his helplessness, and his apprehensions as to futurity. He is afflicted with disease in his own person or in that of his friends. The most tender ties may be burst asunder by death. Calamity of different kinds may overtake him. Naturally and irresistibly he looks to some power, superior to himself, greater and more durable than any Existence yet known to him. Where reason and experience fail, Revelation comes to his aid, and makes known One Being of infinite power, infinite wisdom, infinite benevolence. Man is thus a religious agent. But though his mind is opened to these truths ; though his soul is thus made conscious of its relation to the present and to the future, to his fellow-creatures and to his Creator, he finds nothing that teaches him that this immaterial existence has any power to resist the approaches of disease ; that if it have any power in maintaining health, that influence is entirely indirect, by teaching him to know and avoid causes of disease; and that to prolong the measure of existence, if it have any power, that power is also indirect, and at a certain point in different individuals, and under different circumstances, ceases entirely.

It is necessary thus to recapitulate the principles now stated, for the reason that if they are not remembered, conclusions which have no connection with the premises may be deduced and established. By laying hold of a small number of circumstances, the author calls them facts, which are only partially true, and by no means of general application, by confounding things that are essentially distinct, and by announcing a few doubtful propositions in a poetical and impressive manner, the author of the present work claims for his doctrines exclusive regard, individual attention.

Under the term Dietetics of the Soul, Dr Feuchtersleben wishes to comprehend a knowledge of those means by which the Soul is preserved in health. This constitutes, according to him, Morality; and although all the mental efforts of man tend towards the same great object of cultivating and fostering his mental sense, yet he wishes here especially to consider that power of the mind, by which it is enabled to avert the ills that threaten the body. The reality of this power, he says, has hardly ever been denied. Its wonders have excited astonishment. Its laws are rarely investigated. Its agency is still more rarely brought to bear on practical life. Yet every force, he adds, derived from the spring of mental life, may be cultivated by the hand of man, until it becomes an art. Art is cultivated ability; and if man is advanced so far as to convert even life itself into an art, why should he not do the same for health, which is the life of his life. This is the Dietetics of the Soul, he concludes, the Soul of Dietetics, as one of his commentators designates it.

This is, we suppose, the new method of explaining and stating the purpose and intention, with which a book is written. The Dietetics of the Soul constitutes true Morality. Now, true morality, as usually understood, means to know and do what is right, and to avoid what is wrong; to practise justice, and to avoid injustice and iniquity of every kind;—whatsoever ye would that men should do to you, so to do to them. This, therefore, is the Dietetics of the Soul, or the Sou of Dietetics; for it appears that the terms are equivalent andlconvertible. A natural question arises, whether this be the power of the mind by which it is enabled to avert the ills that threaten the body. If it be, then the upright, the virtuous, and those who eschew all evil, ought never to be assailed by disease; or if assailed, they must have the power, if they choose to exert it, of getting immediately the better of the enemy; and, conversely, the selfish, the sensual, the wicked, and dishonest, if attacked by ills of the body, are completely defenceless, and must fall speedy victims to the maladies by which they are afflicted.

It would be to suppose that a man is either entirely out of the present world, or if in it, that he shuts his eyes and closes his ears to all that is going on among its occupants, to think that he can believe this to present a correct picture of what actually takes place. Daily experience shews not only that it is the reverse; but that the force with which ills assail the body, that is of corporeal diseases, and the means of getting the better of them, bear no relation whatever to the moral qualities of those who are attacked by them. Temperance and sobriety, restraint upon selfish passions and appetites, will doubtless secure against certain diseases, and will render their severity either less intense or more endurable. But to assert that the mind has the power of directly curing these diseases, is to make a statement, which though plausible and agreeable, receives a decided and strong contradiction from daily experience.

Willingly, nevertheless, will we allow the author to state his propositions and to expound his hypothesis in his own way. "Let him," he says, "who refers to the body and the effects described by me as facts of experience, interpret my words to mean a power exercised over all other parts of the body by that portion of it to which the functions called mental belong." The fundamental fact, he adds, remains the same. We have only to deal with the fruitful Truth.

The facts of consciousness, Dr Feuchtersleben observes, which are only recognised by the aid of inward reflection or self-analysis, point to a principle different from those derived through perception. This principle is Mind; an abstraction he says. When associated with matter, it is termed in ordinary language the Soul; and the substance united with the soul we denominate the Body. We cannot, he continues, require proofs that the soul acts upon the body; since we only apprehend each in the unity of its manifestations. Still more futile is it to attempt to explain the manner in which mind and body are united. This is given as the psychological foundation of his doctrines.

We are unable to enter into any examination of the causes which determine illness or recovery. Nor is it necessary. After this admission it cannot be difficult to discover that no correct views can be given in explanation of recovery, and consequently that little reliance can be placed upon the means which the system of the author recommends. Then comes an admirable generalisation.

It is enough, he tells his reader, to know that all disease arises from an internal or from an external influence. Under the former head are included Original Germs of disease; for the development of which, however, some external influence is required. Under the latter are comprehended all external agents which act injuriously on life.

These vague generalities contain nothing that has not been long known, except in the illogical manner in which they are stated. Had the author joined external and internal influences by the copulative conjunction, and not separated them by the disjunctive, he could have made a nearer approach to the truth of what actually takes place. There is no proof, that what are called germs of disease are brought into action unless by the aid of other agents external and internal; and no proof that external agents produce disease, except by acting on frames disposed to disease. The human body,—the animal body,—it may be said is a mortal machine. Its duration is limited. It was never intended to live beyond a certain time. At this time, different in different genera, in different races, and in different individuals, it ceases to be animated with the breath of life. But for this cessation the preparation is made by a change in one or more organs essential to health and life; and according as this change is effected, slowly and imperceptibly, or speedily, and in a way more or less manifest, the transition from health to sickness and disease, and from disease manifest or latent to death is speedy or gradual.

The question comes, then, simply to be this;—Has the Soul or the Mind, or have the mental faculties any power to control, to resist, to counteract the changes in organs, it may be added in functions, by which we know this great transition is effected.

Here is a young female, pale, feeble, pining away under cough, and ill-defined, yet unpleasant feelings within the chest. She has every wish to get well; is full of hope and confidence; will scarcely believe at times that her health is impaired, but from the returns of fits of great and unwonted weakness and occasional breathlessness. There is no want of hope. Yet weakness advances, as the internal destruction of the lung advances; and often with little external change except emaciation, life ceases to animate the frame, sometimes sooner than casual and superficial observers apprehend.

Here is a person with occasional fits of difficult breathing, a painful sensation in the breast, lasting but a few minutes; sometimes blueness of the lips; yet moving about, though not robust, and capable of taking interest and a share in all that is going around him. He is recommended to take care of his health; and all that he is desired to do, he does. He has every desire to get rid of the unpleasant symptoms under which he suffers. All probable means to attain this object he puts in use, apparently with some degree of success. The term nevertheless comes at length. The heart is able to act no longer. In one moment, almost with little other warning, he falls down without consciousness, and in truth is lifeless.

Take another case. A man has lost the power of moving one side of his body. The left arm hangs down; the left leg is dragged helplessly and cumbrously by the aid of the sound side. Speech is a little thick and not articulate; and sometimes when he becomes anxious to express his sentiments, he is only rendered less able to do so distinctly and intelligibly. This person has every desire and makes all efforts to recover the use of his limbs. He employs medical treatment, observes dietetic restraints, and uses all those local appliances which are believed to promise the prospect of recovery. He does so in the confident hope that he is to recover the use, partial or total, of these limbs. All, however, is unavailing. He remains for life, sometimes not very lengthened, a paralytic invalid; speech becomes more inarticulate; memory fails; and at length, after a period shorter or longer according to circumstances, death follows suddenly by insensibility, or slowly by gradual imbecility.

Numberless instances of the kind now mentioned might be adduced. But these are sufficient to shew the slender foundation, upon which rests the doctrine of the power of the Soul or Mind to avert corporeal diseases, and the very limited number of cases in which the alleged influence of the mind is known, and can be believed to operate.

It is only indeed in very trifling disorders, affecting chiefly the nervous system, that this agency ever acts. Hypochondriasis is one of these disorders; but excepting some forms of chronic hysteria, scarcely any other can be mentioned. Dr Feuchtersleben refers, we perceive by his reasonings, to instances of persons who, after long labouring under what is called Lypemania or Melancholy, have committed suicide; and adduces as examples, such cases as that of Werther and Heinrich von Kleist. We scarcely expected to see adduced in a work professing seemingly to treat a subject scientifically, a fictitious narrative, and a narrative especially like that of

Werther. It has been more than once said, that it is one of those precious fictions founded on facts. If this be the case, the argument is not in any degree improved. In what manner a silly and unprincipled young man, who conceives for a married woman a passion at once foolish, wicked, and immensely disgusting, is to be amended by the present system of Dietetics of the Soul, is to us, and we believe to many more, altogether incomprehensible. The character of Werther, as delineated by the great leveller of moral distinctions, is merely that of an unprincipled young man, whose education had been entirely neglected; who, in learning to read Homer, had never been practically taught the Decalogue and the New Testament. As to Von Kleist, or any other sentimental whining man, it is altogether impossible to entertain any other opinion than this, that the whole tribe of suicides are in general selfish, sensual creatures, dissatisfied and discontented with everybody and everything, compounds of wickedness and madness; objects, perhaps, sometimes of pity, but much more frequently of contempt and abhorrence. Excessive pride, conceit, ungovernable passion, no reflection, no self-control or self-denial, are the usual ingredients which constitute this order of persons.

A section on Imagination ought to have pointed out all the evils which result from the irregular indulgence of that faculty, and the neglect of keeping it in subordination to judgment. Yet, amidst a great amount of fine-thinking and sparkling observations, the only thing almost that is of true importance, is the following statement,—" All diseases of the mind have their origin, and what is called their seat, in the Imagination. If their seat were really in the mind, they would be errors or vices, but not diseases; and if in the body, they would not be diseases of the mind." In point of fact, mental diseases often contain, if they do not consist in errors or vices. The section, in other respects, contains the usual amount of marvellous stories, of persons who have been attacked through fancy by diseases, of persons who have laboured under imaginary diseases, of those who have died from fright, and various others, which may be collected in abundance from the columns of newspapers, and all similar veracious records. Then comes a second allusion to the fate of Novalis and Von Kleist, as victims of the effects of the morbid Imagination.

The author considers in the same manner in section fifth, Will, Character, Indecision, Ill-Humour, Distraction; in section sixth, Understanding, Culture; in section seventh, Temperaments, Passions; in section eighth, the Affections; in section ninth, Oscillation, or those transitions and alterations, which are observed in the vital actions and in the emotions; in section tenth, Hypochondriasis; in section eleventh, Nature, Truth; and the twelfth section is given as a summary of the whole.

The section on the affections is in many respects the best in the book. The object is to shew that the affections and emotions, though acting on the body and the man, may be regulated and moderated without being extinguished; and that the most effectual means of accomplishing this object is the love of the Supreme Being. The love of God, he says, is the purest, best, and strongest of all human affections. This absorbs all other affections; and by making men renounce and resist their own inordinate emotions, forms the only true source of happiness.

In this section, nevertheless, some will doubtless discover an important omission. The effect of the depressing affections, as grief, sorrow, fear, anxiety, uncertainty, is often so great and so hurtful that they are a frequent cause of disease. The grief of a parent for the loss of a child, the distress of a husband for the death of a wife, the affliction of a sister for the loss of a brother, have all been known to be causes of serious disease, and their injurious influence in this manner has been fully admitted by physicians and physiologists. These effects seem to be directly and almost purely injurious, and they are produced by the agency of the mind; the action of the immaterial part upon the organs of the material frame. In this instance, not only is the soul, even in persons of the best dispositions, unable to avert the ills of the body, but it becomes itself a means of inducing them and maintaining their injurious operation.

The sovereign cure for all human ills, the author assures us, and therefore the best means for preventing them, are Truth and Nature; these form the remedies for poverty, affliction, disease, calamity of every kind. All this we must suppose is true and just. Here comes the truth.

We cannot, if we would, the author allows, enjoy a state of existence perfectly free and pure; that is, as we understand, of corporeal health and moral purity; because we are encompassed on all sides by an immense and universal net of falsehood; the falsehood of social intercourse, an external bondage which we cannot evade, but which sometimes inspires us with respect. Respect for what? for falsehood; surely this is either a mistake, or it is altogether impossible to feel either pity or regret for any one who thus degrades himself. Falsehood may cause dread and anxiety for the mischief to what it gives rise; but it can never command respect.

All morality consists in truth, again, he tells his reader; and all depravity is falsehood; that is, if a man robs, plunders, and murders his neighbour, so long as he does not lie, so long as he says, I have robbed, I have plundered, I have murdered, he is a person of indisputably good morals. Falsehood is undoubtedly an indication of great depravity; and we believe that at the present moment a very large proportion of society are in this respect depraved and immoral; for the extent to which falsehood is practised, is wholly inconceivable and altogether incapable of being estimated. Falsehood, or speaking falsely in various modes, stating that to be fact which is not fact, and representing what is true to be false, is infinitely more common than the opposite; so common that it may be regarded as the rule, while the opposite is the exception.

This is in point of fact admitted by Dr Feuchtersleben. Life and health, he continues, accompany Morality and Truth; depravity and falsehood are destruction. Constant falsehood and painful restraint corrode the innermost springs of life, like a hidden poison, while we experience a morbid pleasure in feeding the worm which consumes us. Never has this art,—the art of lying,—it is Dr Feuchtersleben who speaks, flourished so highly as at the present day; and the extent to which we pride ourselves in our weakness is only paralelled by our vanity, which regards refinement a complication of untruths as evincing the height of development. No one has the courage to be what he really is. Yet the corner-stone of health is to maintain our individuality entire from every constraining influence.

He afterwards announces that he has a great discovery to make known. This is, that Genius is Truth. In this there is perhaps a degree of truth, if we had time to shew in what manner.

For all this mischief and evil resulting from the prevalence of falsehood, he at length informs us, the only true means of saving the human race is Nature, the pleasure derived from the study of nature. In this, at least, it must be allowed that he is right; and as the truth is self-evident, we say not one word upon it.

In the summary, which the translator fancifully calls, in the present taste for foreign names, the *Resumé*, he gives a few of those marvellous, oft-repeated, and not very certain facts which all lovers of paradox are fond of producing. Among others, in order to demonstrate the influence of Mind over Life and Death, comes the oft-quoted and ill-understood story which George Cheyne records of Colonel Townsend. Like all the other second-hand narrators of this scene, he says nothing of the final result. That, of course, would have destroyed the effect both as a marvellous story and as an example of the influence of Mind over Life and Death. Twenty similar stories might be told, all shewing the same influence equally well, and all equally capable, in good hands, of shewing any influence whatever, or no influence at all. For remarks on this case we refer to volume seventy-fourth, p. 423.

Some good sayings nevertheless there are in this Summary; especially that which says, "Self-government is the great and eternal law which Life, Duty, and mental Dietetics, enjoin upon man. They ordain him to carry out with truth and resolution, the silent mandates of his conscience. To preserve health of mind, and hence of body, we must govern ourselves, and remain through life true to this resolution."

This book is written, it may be perceived, in that misty ambitious style, which makes the author think that he is communicating important truths, when they are merely what have been taught by many moralists, poetical and prosaic; and which may also make the reader believe that he is acquiring the knowledge of new facts and new ideas when he is merely amused by a great number of words.

There is in use among the old writers on Medicine and Physiology, an old term, *Regimen Mentis*, which they employ to designate that regulation of the passions and appetites, that control over the emotions, affections, and feelings, which they conceived always necessary to the preservation of health, and not less indispensable to its restoration when impaired by disease. This *Regimen Mentis* is the Dietetics of the Soul of Dr Feuchtersleben; and to some persons it will appear the more eligible and logical denomination of the two. Dietetics is that branch of medicine which teaches the regulation of the most proper species of food and drink; the fixing as nearly as may be practicable, the kind and amount of food and drink suitable to particular states of the system, and the times and seasons at which food and drink should be taken. What articles of food and drink does the Soul take? To matter-of-fact persons this seems a sufficiently violent figure of speech. The soul is immaterial and spiritual. The food of the body is gross enough. Is there any analogy between them? Is there so close an analogy between the appetites of the body and the passions and affections of the mind as to justify the substitution of the new term for that which has been long in use, and which by use had in some degree been consecrated?

This application of the term has led the author into a strange, misty, and twilight sort of atmosphere, in which he has mingled and confounded things altogether different. Moral and virtuous conduct are associated with good health, as if they were inseparable; as if the robust healthy man were a model of virtuous and upright conduct. The conclusion must be, though it is not stated in express terms, that the feeble, the delicate, and the invalid, must be vicious, sinful, false, and deceitful. Disease is represented to be synonymous with iniquity; and sound health is a proof of integrity and rectitude. It then turns out, after not a little illustration and declamation, that hypochondriasis, melancholy, and mental derangement, are the concomitants, if not the indications, of an immoral state of the Soul. It is like the dark gloomy forest through which Æneas is led in his descent to Avernus. He sees frightful spectres, gloomy beings, the ghosts of friends and foes, through a dark mist, which has the effect of rendering every object more dismal, and preventing its true characters from being recognised.

Ibant obscuri solâ sub nocte per umbram,
Quale per incertam Lunam sub luce malignâ,
Est iter in sylvis; ubi cœlum condidit umbrâ
Jupiter; et rebus Nox abstulit atra colorem.

The great means of regulating the Mind,—the true regimen of the Soul,—consists in that moral and religious training, which teaches that the world is a place, not of enjoyment, gratification, and ease; but of duty, trial, self-control, and endurance. Απεχου ϰαι Ανεχου, abstain and endure,—the watchwords of the Stoical School, are not less those of the sincere followers of the Christian Faith. It is the want of this training that gives rise to those evils to which the present author refers; to hypochondriasis, discontent, melancholy, *lypemania*, moral insanity, and various forms of deranged mind. The constant craving after things morally and physically unattainable, sometimes prohibited, is one of the most fertile sources of moral insanity and suicidal mania. In minds so constituted, disappointment in any expectations, however natural that disappointment may be, creates discontent and peevishness, where it ought to inspire fortitude, vigour, and resignation. If disease assail, it is our duty to employ all reasonable and practicable means to oppose, and if possible, to overcome it. But, if this prove to be impossible, the next best course is to endure with patience, trusting that He who inflicted the blow may see meet either to withdraw his heavy hand, or to send strength to bear the affliction. It is only in this manner, by a firm faith in this support, that the Soul can expect not only to avert the ills which threaten the body, but to be enabled to endure them without murmuring and repining. Though health of body is undoubtedly one of the most valuable possessions that man can enjoy, there are things which are still more conducive to the wellbeing of man. There are worse things than sickness, and even than death.

> Fortem posce animum, et mortis terrore carentem,
> Qui spatium vitæ extremum inter munera ponat
> Naturæ, qui ferre queat quoscunque labores
> Nesciat irasci, cupiat nil, et potiores
> Herculis ærumnas credat saevosque labores
> Et venere, et cœnis, et plumis Sardanapali.

To perceive that affliction, disease, and adversity may be blessings in disguise, is the nearest approach to happiness and ease of mind that can be made on this side of the grave.

ART. VI.—*Alleged Importation of Yellow Fever into Southampton, by West India Steam-Vessels.*

What is denominated a great sensation, with not a little apprehension, has been excited at Southampton and the neighbourhood, by the statement being made that yellow fever had appeared there in the end of November and first week of December 1852.

A Mr Napier, late fourth engineer of the Royal Mail Steam-Ship La Plata, died, it appears, on Sunday the 5th December of fever. He landed from La Plata in apparently good health; but on Sunday, the 28th November, was seized with symptoms of violent fever. Dr Ware of Southampton attended him, and employed all means calculated to abate the symptoms and relieve the sufferings of the patient. On Wednesday, the 1st December, came on a symptom called black vomit, and continued till the death of Mr. Napier, which took place on Sunday the 5th, at eight in the morning.

Dr Ware, the medical attendant, pronounced the case one of malignant fever, but hesitated to call it yellow fever. Dr Wiblin, the health officer of the port, was requested, on Saturday the 4th, to see the patient, having witnessed some previous cases on board the La Plata; and, in presence of Dr Harvey, late of Aberdeen, a specimen of the black matter vomited was preserved, and was to be forwarded to Sir William Pym.

Sir William Pym went to Southampton on Monday the 6th, and after, it is said, inquiring into the circumstances, arrived at the conclusion, that the case of Mr Napier was one of yellow fever.

It is reported, though the authority is not stated, that one of the crew is laid up with symptoms of similar fever a few miles from Southampton.

In the meantime, means were not neglected to increase whatever apprehension was excited by the death of Mr Napier. At first, it was reported on the 8th December, that the woman who had attended him as nurse was labouring under yellow fever; and this report seems to have been for several days believed. It was at length, however, announced by the medical attendants, that the woman was suffering not under yellow fever, but under a common febrile attack from fatigue, cold, want of rest, and some anxiety.

At this stage of the business, another contrivance was had recourse to, in order to keep up the agitation in as perfect a state as possible. It was stated, first, that yellow fever did not take place, never had taken place, and could not take place in this country, and that it was a disease either of tropical countries, or of countries with temperature approaching to tropical. To this it was answered, on high authority, that yellow fever prevailed to some extent in Dublin in the years 1825 and 1826; and that though a great many persons were destroyed by it, a much greater proportion recovered. Then it was added, that it is well known, that, in seaport towns, an isolated case of yellow fever occasionally occurs, but it is rarely attended with black vomit. In such circumstances, the sufferer, this authority says, is invariably one who has returned from a tropical climate. It was then concluded, that, as regards the importation of the disease in La Plata, no doubt whatever could be entertained; and the possibility of this was formally assumed, because the West India Islands are brought within twelve or fourteen days' sail of England, in consequence of the great improvements in steam navigation.

It was allowed, nevertheless, that, notwithstanding these ominous facilities for the transportation of yellow fever, the disease could not exist long in this country, unless under very peculiar circumstances, such as take place in very close moist weather; that the disease would be infallibly extinguished by the approach of frost.

We shall afterwards consider what weight ought justly to be attached to statements such as those now made.

At this date, 8th December, the Medway was expected to arrive every hour. Fever, it is said, was prevailing at St Thomas's, and in many other West India Islands.

The Medway was detained four days at St Thomas's, waiting the arrival of the Gulf steamer, and had occupied nearly nineteen days in crossing the Atlantic. She arrived off Southampton on the 9th of December.

On reaching the upper dock moorings on Thursday December 9, the Medway was immediately visited by the customs boat, containing the Deputy Health Officer; and it was ascertained that five cases of yellow fever, terminating fatally, had occurred on board since leaving Jamaica; one midshipman, one quarter-master, and three firemen. It is said the total number of cases on board amounts to seventeen. The total number of deaths, since leaving Jamaica, is eleven; but of these only five were occasioned by yellow fever.

The existence of yellow fever in the town of Southampton was at this time officially denied.

Of the crew of the La Plata two, who were said to have been ill, were recovering. They were invalids, but not, it is said, ill with fever.

Yellow fever had been prevailing in Jamaica, Barbadoes, St Lucia, British Guiana, Martinique, in the last, worst.

727 persons died at Fort de France since 12th January 1852.

1200 at St Pierre, making in all 1927 in nine months in the two towns.

Population of Fort de France in Jan. 1848 .	12,611
„ of St Pierre, . . .	20,360
„ other 21 Communes . .	87,208
	120,179

The alarm and agitation consequent upon the arrival of La Plata first and the Medway afterwards, had wellnigh subsided, when it was again revived by the arrival of another of these West India steam-ships.

On the 19th of December, at 10 A.M., the Royal Mail steamship Oroonoco arrived off the Port of Southampton, having left

Chagres,	on the 24th November.
Demerara,	on the 25th „
Tobago,	on the 26th „
Trinidad and Grenada,	on the 27th „
Barbadoes,	on the 28th „
Jamaica,	on the 29th „
and St Thomas',	on the 3d December.

This vessel, it seems, had on board forty-one cases of fever, some yellow, some bilious remittent, in the course of the voyage; and of these the following nine cases terminated fatally:—

November 28, John Godby, Fireman.

December	6,	Thomas Stevens,	Waiter.
„	8,	Henry Savage,	Yeoman of closets.
„	10,	John Weston,	Landsman.
„	11,	David Hay,	Waiter.
„	15,	Henry Isles,	Fireman.
„	15,	John Fryer,	Waiter.
„	15,	Mr Stephens,	Passenger.
„	16,	William Williams,	Fireman.

On November 24 died Mr Lighton, passenger, of consumption.

At Jamaica Hospital were left four men, all ill it is said of yellow fever: William Short, fireman; William Dally, fireman; Joseph Dennet, fireman; Charles Biddlecome, trimmer.

This report is the result of inquiries made by Mr Wiblin, the medical superintendent of Quarantine, and his deputy Dr Harvey, and answered upon oath by the Commander and Surgeon of the ship. Mr Schuyler, surgeon of the Oroonoco was taken ill on the 6th of December with fever; but he was convalescent when the vessel arrived in Southampton River. His place was taken and his duties performed by one of the passengers who belonged to the medical profession, and who devoted his entire time to the attendance of those who were sick on board. Mr Stephens, the only passenger who died from yellow fever, had come from California, and was attacked by symptoms of the disorder on the 13th of December. He did not, however, make known his case to the medical officer till black vomit made its appearance on the 15th; and the same afternoon he died. It is added, that this gentleman had in his berth a considerable quantity of gold dust, and abstained from asking advice through the fear that some of his property might be purloined or abstracted during his illness.

The convalescents were reported on the 19th December to be doing well. Three of the number were said to be ill with typhus fever.

As the instructions under which the Collector of the Port is acting, require that neither the ship nor passengers can be granted *pratique*, until ten days have elapsed since the most recent case, and as the most recent is that of Mr Stephens, dead on the 15th, the passengers, crew, and cargo, were expected to be detained until the 25th December.

On the evening of the 19th, it is further said that another death took place at six o'clock in the person of a boy or youth, name not mentioned, a passenger on board the Oroonoco, from yellow fever.

On the 20th December, Sir William, who had come from London, gave directions, that for the present the vessel should remain in quarantine.

The mails were landed on the 19th, in the evening before eleven o'clock.

In the events now noticed, there is nothing which might not be expected to have taken place, either as to the occurrence of cases of fever on board these vessels, or as to the apprehensions to which these occurrences have given rise. The vessels have been in the very situations where endemic fever prevails, if not annually during autumn, at least so frequently that it would have been extraordinary if some of their crews had not been attacked. The different islands of the Caribbean Sea, the Antilles and the Leeward Islands, have been long known to be the endemic producers of these fevers; and though fever is not every year equally prevalent or equally fatal, yet it is clear that only a particular sort of weather, a certain combination of atmospheric and meteorological phenomena is necessary to give rise to fever in an epidemic, that is, a general and comprehensive form.

It is next to be remembered that endemic fever, that is to say, the fever which is sometimes called *Yellow Fever*, sometimes *Bilious Remittent*, always arises first and prevails most in the very situations and parts of these islands and coasts where the vessels have been. Wharves, coasts, carenage stations, harbours, quays, and jetties, are invariably the places in which fever most commonly first appears and prevails most generally. There is on the coasts and strands of these islands a combination of physical characters favourable, so far as is known, to the generation of fever. A coast often low, always liable to be exposed by the fall of the tide to the rays of a hot sun, with large quantities of animal and vegetable matter undergoing decomposition, a sea margin easily acted on during the recession of the sea, by heat, are the characters of all the places visited by the steam-vessels coming to Europe. The disease prevails not, and is not known in the interior and elevated parts of the large islands, as Jamaica, Cuba, and Hayti. But along the coasts and in the harbours of these islands, it is always liable to take place among Europeans, especially seamen; and the same is true of the small islands, as St Lucia, Martinique, Barbadoes, and similar places.

This season it appears that Fever, that is Endemic Fever, has been very prevalent in several of the small islands, as Barbadoes, St Lucia, Martinique, St Thomas's, and along the lower coasts of the Continent, as at Surinam and Demerara. In would be idle to speculate on the cause of this prevalence, until we obtain some accurate information on the state of the weather in the summer and autumn of 1852. It is sufficient to know that such is the fact, and that Europeans, especially seamen, have been most extensively and numerously attacked by the disease. In the course of a few months, we shall undoubtedly find in the American journals, and other publications, ample confirmation of the correctness of the circumstances now specified, and full statements of the causes to which the origin and prevalence of Fever this season is to be ascribed.

When we look to the places visited by the steam-vessels, and the dates at which they visited these places, there is no difficulty in understanding how their crews were attacked. The coast, atmosphere, and soil of the whole of these places is, at the season mentioned, highly productive of endemic fever. It is an atmosphere of miasma, or what is called, using the Italian term, Malaria. The vessels go into this atmosphere and remain in it for a certain time ; and all experience shews that a short time only is requisite. Sleeping one single night, or even a few hours in such localities, is quite sufficient to enable the crews to imbibe or to inspire a sufficient amount of the miasmatic air to produce attacks of Fever. The places touched at have all been more or less productive of fever, some of them in a very great degree. St Thomas's was the last place touched at by the Medway and the Oroonoco ; and the last vessel was there on the 3d of December. This island has been highly productive of fever this last season.

Neither must it be forgotten, that there is in the persons of Europeans, and their modes of living, and especially in those of seamen, circumstances which have at all times been observed to act as powerful, disposing, and exciting causes of the production of fever. The habit of eating largely of animal food, and indulging freely in vinous and spirituous liquors, renders English seamen especially a ready prey to endemic fever in the seasons and countries in which this disease prevails. The former article of food excites and maintains a heated plethoric state of the system, rendering it susceptible to the attacks of disease, and rendering also these attacks at once violent and unmanageable. It is remarked in the West India Islands that the French and Spanish visitors and seamen are much less numerously and less severely attacked than the English and the American seamen from the Northern States of the Union ; and that negroes and the coloured population are very rarely attacked, and never by severe forms of the disease. There is no doubt that what contributes to the comparative immunity of the French and Spanish seamen, is their more sparing use of animal food, and their greater temperance as to the use of intoxicating liquors than the English. An attempt has often been made to explain the comparative immunity of the negro and coloured race by ascribing it to some physiological peculiarities of the skin, and the constitution of the African race generally. This may in part have some influence. But the main cause is, undoubtedly, the circumstance that the negro and coloured population make much less use of animal food, and live mostly upon vegetable articles ;—as rice, Indian corn, yams, and similar substances. These people conform to a mode of living required by the characters of the climate. The English seaman brings into the tropics his habit of devouring beef and mutton twice or three times in the day, and drinking considerable quantities of malt liquor and ardent spirits; and for this disregard of the adaptation of food to climate he pays the penalty in the shape of fever, dysentery, liver disease, and cholera.

Looking to the kind of people who were attacked by fever in the Oroonoco it requires little penetration to see, that the subjects of the disease have been selected chiefly among those who either take strong drink pretty freely, or are in the way of doing so. It would have been desirable to have a correct statement of the occupation and habits of all the forty-one persons attacked. This has not been given; and it would be using too much freedom in conjectural reasoning to say, that the whole forty-one persons must or may have been people who preferred mixing water with spirits to the pure element. But when among the nine fatal cases are seen waiters and firemen in so large proportion, it is manifest that the influence of the febrile action has been aided and strengthened in no inconsiderable degree by the habits of the parties.

It is remarkable that females are attacked in much smaller numbers than men; and that among those attacked the disease is much less frequently fatal. The reason of this comparative exemption it is not difficult to understand.

When all these circumstances are considered it seems not at all wonderful that on board the Medway, since her departure from Jamaica, there occurred seventeen cases of fever and five deaths, and that among the crew of the Oroonoco there were forty-one cases and nine or ten deaths.

As a proof and further confirmation of the ready susceptibility of British seamen to attacks of Caribbean fever, the case of H. M. Steamship Dauntless during these two months of November and December may be conveniently and aptly taken.

This vessel sailed to the Island of St Thomas for taking in coals during the first week of November, at the very time at which endemic fever was prevailing in the island and its coasts. The vessel left St Thomas's on Wednesday the 10th of November for her previous station. At this date it would appear that some of the crew were ill; for on Friday the 12th of November, it is that said the distinctive characters of yellow fever were made manifest; and on Saturday the 13th the first death occurred. Many persons had been already taken ill; and on the 14th of November, upon the requisition of the Surgeon, it was deemed proper to direct the course of the vessel as quickly as possible to Barbadoes. There she arrived on the morning of Tuesday the 16th of November, at which time forty cases of fever had taken place and eleven persons had died. On the 17th they were enabled to convey on shore to hospital all the sick. The disease, however, continued to spread rapidly among the crew not previously attacked; and in the course of ten days more, by Saturday the 27th of November, forty-six cases more had taken place, making in all eighty-six cases and thirty-five deaths.

At the last accounts the most of the crew and officers had been allowed to go on shore and reside in tents; fewer cases had taken place, and these were much less violent and rapid in course than at the commencement.

One of the parties who gives an account of this visitation says, that it is the opinion of the medical practitioners that the fever came from Cayenne, along Guiana and upwards, through the islands. The interpretation of this is merely, that fever was prevailing previously at Cayenne, a most unhealthy spot, and along the coast of Guiana, well known as a region highly productive of endemic fever; and that nothing more is known of the origin of the disorder. The truth, is that in all places where the requisite physical conditions concur in the West Indies, fever has been prevailing to a very great extent this last summer and autumn.

The important feature, however, in this case is, that here is a whole ship's crew with English constitutions and English habits of living, brought suddenly within the area of endemic fever at the season most suitable for giving rise to attacks; and no sooner are they placed within this sphere, than instantly they are numerously and severely attacked.

Another lesson not less impressive, which is taught by the case of the Dauntless, is that, in such circumstances, contagious propagation is altogether out of the question. In the case of contagious diseases, it is one person here, another there, and slowly and progressively as the individuals are exposed to those affected, are they attacked. In this case, on the other hand, within a very short space of time after the whole ship's crew are thoroughly exposed to the febriferous air of St Thomas's, a great number are attacked so simultaneously and so rapidly, that the conclusion is quite inevitable, that all these persons must have been exposed to, and were under the influence of, one general cause, whatever that may be. So far as the evidence goes, on the 10th of November, or on the 9th of November, the ship's crew were in their usual health. On the 16th of November, that is in the course of six days, forty persons had shewn distinct symptoms of fever ; and in the course of seventeen days, eighty-six persons were attacked, and seven-seventeenths are destroyed. This is not like contagion, or the operation of a contagious disease. It is the case of a large number of human beings exposed to one general cause of illness, and all the susceptible persons simultaneously, or within a short interval of each other, attacked by its characteristic effects.

What the crew of the Dauntless presents on a large scale, those of La Plata, the Medway, and the Oroonoco, present on a smaller scale. The crews were in the febriferous atmosphere, and those most susceptible were attacked.

With these facts and views, it will not appear wonderful that we can see in the cases of fever in these steamships, no proof, no evidence of the presence of a contagious disease. The cases were merely examples of West Indian or Caribbean fever, as it has been often called, attacking susceptible persons, and wholly confined in its action to them. Quarantine, as a protective and counteracting measure we regard as not only useless, but hurtful, in so far as any persons that were ill could not communicate the disease to others, and would recover much sooner and more easily, if taken out of the vessel and treated in comfortable quarters on land ; while to those not presenting symptoms, the confinement on shipboard is a most serious evil, and might give rise to the formation of ordinary ship-fever or typhus. The fever which affected the persons on board these vessels was endemic fever, the usual remittent-continuous of the Caribbean islands and tropical countries ; and it could not be imported into this country, unless the physical circumstances under which it is generated, were also imported.

With regard to the distinction attempted to be drawn between Yellow Fever and Bilious Remittent Fever, more than once we have shewn in the pages of this Journal, that there is either no distinction except in intensity or degree; or, if there be any distinction, it is merely this, that yellow fever is more closely connected with a general epidemic constitution of the atmosphere and weather than bilious remittent. At the same time, while it is an admitted fact that fevers with Yellowness and Black Vomit co-exist with bilious remittent in the same season, in the same places, and in the same epidemic, it is not easy to see how, according to the rules of sound reasoning, any real distinction in kind and nature can be drawn between these forms or varieties of fever. In short, it is manifest that Yellow Fever is more intense and severe. Remittent, with disintegration of the blood and the capillaries of the stomach, and that Remittent is only that mild form of Yellow Fever which does not advance to yellowness and disintegration of the blood and bloodvessels.

This is the proper place to advert to the statement regarding the alleged occurrence of yellow fever in Dublin in 1825 and 1826. The disease, which at that time took place in the metropolis of Ireland, was not yellow fever such as is observed in the Caribbean islands, but one of the common forms of continued fever to which Ireland and its population are periodically liable, accompanied in occasional cases with yellowness of the surface, and presenting none of the bad symptoms peculiar to Caribbean fever. A similar fever, with occasional yellowness, was observed in Edinburgh in the year 1843; and, if we are not misinformed, the same form of fever was observed in Glasgow. But, on neither of these occasions, did the fever present the characteristic symptoms of the endemic fever of the West Indies and Equinoctial America. Fever with yellowness is one thing; Yellow Fever is another, totally different. No one who is at all conversant with the fevers of temperate climates and with those of equinoctial countries, would maintain that they are the same, however similar in some features they may appear to be.

Though we have directed attention chiefly to the usual and ordinary circumstances, under which fever in the West Indies attacks Europeans and especially British seamen, we are not prepared to say, that in certain seasons, and in particular situations, fever may not arise on board certain vessels, and may seem to cling to these vessels with so great a degree of tenacity, as to give rise to the idea that there may be in the vessel some peculiar febriferous principle. The facts that have been recorded by various observers, but especially by Dr John Wilson, as to the occurrence of fever in particular vessels on the West India stations, tend to shew, that there may be in these vessels, probably in the timber of which they are constructed, or the mode in which it is put together, some peculiar circumstance or circumstances which are favourable to the generation of fever. At the nature of these circumstances we can scarcely pretend to guess. Dr Wilson thinks that the timber undergoes, in hot climates, some remarkable change favourable to the production of fever; but what this change may be is very difficult to say. That the prevalence of fever in certain vessels may be connected with some circumstance of the kind now referred to, seems probable also from the tenacity with which the disease adhered to the Eclair, which, after her name had been changed, was not much less remarkable for the prevalence of fever than before. All this, however, must be left to be elucidated by further inquiry.

It is said that in reference to these Royal West India steamships, directions have been issued by the authorities at home, the Admiralty we understand, that no person labouring under fever, or other invalids, shall be received on board at any of the places at which the vessels touch in the Caribbean sea, and on the South American Coast. This precaution appears to be judicious, and may be useful in preventing much trouble and apprehension among the crews and passengers of these vessels. It may be doubted nevertheless, whether it will act as a complete preventive of fever in sickly seasons, and during the autumn generally. A much more effectual and certain remedy could be found by putting a complete prohibition against the use of spirituous liquors, and all other means either of intoxication or of deranging the action of the digestive organs; whatever in short tends to stimulate or excite;—and in the more moderate use of animal food. Precautions of the kind now mentioned, with attention to ventilation and cleanliness both in the ship and in the persons of the crew, would form the most certain prophylactics against attacks of fever, which may be annual, and which must be frequent on board these vessels in certain unfavourable seasons. In quarantine restrictions and restraints, we have already said that it is impossible to repose any confidence against such a disease as Yellow Fever or Remittent Fever. The only sure means of protection is not to go into the locality where we see the disease prevailing; and if this is impracticable, which it is, in the present state of commercial and intercolonial communication, to employ those precautions personal, dietetic, and nautical, which are most likely to preserve the health of seamen, and prevent them from becoming a prey to endemic disease.

PART III.

MEDICAL INTELLIGENCE.

TOXICOLOGY.

Account of the effects of the Bite of a Cobra de Capello, or Spectacled Snake. By Dr Burder. From Medical Times.

Edward Horatio Gurling, aged 31, was brought to University College Hospital on the morning of Wednesday, October 20. His occupation was that of a keeper at the Gardens of the Zoological Society, Regent's Park; and the part of the collection placed under his special charge was that contained in the reptile house. He had held this appointment for upwards of twelve months, and was fully conversant with his duties, and well aware of the caution required in their discharge.

Generally speaking, his habits appear to have been temperate, and his conduct rational, but he had occasionally, of late, been intoxicated. During the night previous to his admission he had been drinking freely, and on presenting himself at the gardens in the morning he was observed to be partially intoxicated.

About 8 A.M., while engaged in his duties at the reptile house, he commenced a series of rash familiarities with some of the venomous serpents. After removing an African cobra from its cage, and twirling it about his head, he replaced it without having received any injury, and took out an Indian cobra. This he also played with for some time with impunity, allowing it to crawl round his body beneath his waistcoat. Shortly afterwards, however, while he was holding the snake before his face, the creature made a dart at him, and inflicted a wound on the upper part of his nose. This occurred about 8.10 A.M.

For about 20 minutes after the receipt of the wound there appear to have been no striking symptoms, apart from his agitation and alarm at the occurrence, and during the time he was able to walk and to talk without difficulty. After 20 minutes, however, he began to stagger in walking, and ceased to speak intelligibly. At the same time movements, apparently convulsive, of the mouth and of the limbs were observed. He made no special complaint of pain or other sensation. As soon as a vehicle could be procured, he was placed in it and brought to the hospital. During the transit he was observed to grow very rapidly worse. Up to the time of his admission no treatment had been adopted.

He was brought to the hospital at 8.45 A.M., and was seen almost immediately afterwards both by myself and by my colleague, Mr Gamgee. At this time he was unable to speak, and consciousness, as the sequel will shew, was all but—possibly quite—abolished. He moaned, grasped his throat with some eagerness of action, tossed his head from side to side, and moved his arms and legs in an uneasy, restless manner, not apparently convulsive. When asked in a loud voice if he felt pain, he made no reply, nor gave any indication of intelligence beyond the action already noted of placing the fingers on the throat, and as he had already made this movement spontaneously, there was no certain evidence that he heard or understood the question put to him. He was unable to support himself in a sitting posture. His face generally was slightly livid, his eyes fixed, his pupils rather large, acting sluggishly to light. The skin was of natural temperature and moisture ; pulse 120, regular in rhythm, but unequal in force—most of the beats, however, being tolerably full and strong.

On the upper part of the nose were a number of small punctured wounds, from one or more of which a small quantity of blood had flowed. The eyelids of the right eye, especially the upper, were swollen and livid, the lividity extending to the right side of the nose. The eyelids of the left eye were not thus affected. There appeared to be no swelling of the tongue.

These observations were made rapidly, as the patient lay upon a couch in the casualty room. He was immediately transferred to the ward, undressed, and placed in bed. The interval that elapsed between his being first seen and his being put to bed, though certainly not exceeding five minutes, witnessed a material change in his symptoms. The first accurate observation of his respiration was made just prior to his being lifted into bed. It was then 20 per minute, very shallow, without stertor, and free from any sound indicating laryngeal or tracheal obstruction. By this time the movements of the extremities had entirely ceased, the lividity of the face had markedly increased, a free perspiration had occurred over the surface generally ; the pulse continued tolerably good.

As it was now evident that the man was rapidly dying from failure of the respiratory function, preparations were made, without delay, for the employment of artificial respiration. Probably within a minute after the man was in bed (namely, about 10 minutes before 9) the apparatus was in readiness. By this time the natural respiration had ceased, and, but for the continuance of the pulse, the man might have been pronounced dead. The pulse at this moment (*i. e.*, after natural respiration had ceased, and before artificial respiration had been commenced) was at the rate of 32 per minute, remarkably irregular both in rhythm and in force, some of the beats being strikingly full and bounding.

The bellows for artificial respiration were now brought into play, the nozzle of the instrument being introduced into the nostril, the pharynx closed by pressure upon the larynx, and the expulsion of the injected air being aided by the firm rhythmical pressure upon the chest and abdomen.

Artificial respiration had been continued for exactly two minutes, when the pulse being again counted, was found to number 70 per minute, and to be less irregular.

After a further interval, artificial respiration being suspended for a short time, in order to make arrangements for the application of galvanism, the pulse fell to 50. Artificial respiration being resumed, the pulse rose quickly to 70.

A galvanic current, passed from the back of the neck to the abdomen, was productive of no visible benefit. Nevertheless, it was continued during the greater part of the time that artificial respiration was being employed.

With this latter means we persevered for a period of 50 minutes, with the exception of two or three very short intermissions. The pulse during almost the whole of this time continued of fair power and volume, maintaining, however, its characters of irregularity and inequality. On two occasions it was counted at 104, on another at 72. At no time was there any indication of a recovery of natural respiration; yet there was a muscular movement perceptible almost throughout—namely, a chronic contraction of the sterno-mastoid muscles, very irregular in rhythm, palpable to the hand of the assistant who grasped the throat. It was felt till within about a quarter of an hour of the cessation of the pulse.

At 40 minutes past 9 A.M. the pulse at the wrist ceased to be felt, and the ear being applied to the chest no sound was heard. All hope of recovery was now given up, and the use of remedies accordingly discontinued.

The skin, during the 50 minutes of artificial respiration, continued moist, and, for the most part, warm. Towards the close the temperature fell.

The lividity of the face continued during the whole time. No discolouration of other parts of the body was observed. There was no swelling of any part beyond the local swelling already described.

During the time that he was in the hospital there was no vomiting, nor any discharge, either from the bowels or from the bladder, nor was there any evidence of such having occurred before admission.

After death, the wounds upon the nose, being more carefully examined, were found to present the following characters:—Immediately above the middle of the organ, on either side of its centre, was a horizontal row of small punctures; on the left side four (the three next the centre, being, however, mere scratches), on the right side two, larger than those on the left. Half an inch above these was another row of punctures of somewhat greater size; on the left side two, on the right side one, that on the right side being again the largest. A quarter of an inch higher still, on the right side of the nose, was the largest wound of all, transverse in direction (as were, also, such of the others as had any appreciable dimensions), measuring in diameter about a sixth of an inch, and in depth extending apparently through the substance of the true skin. From this wound a little blood was oozing; the others were closed by coagula.

At 11.30 A.M., a thin bloody fluid was still exuding from the highest wound, none from the others; there was no *rigor mortis*.

At 15 minutes past noon, a patch of pale blue mottling was observed over the lower part of the chest on the left side, irregular in shape, about four inches in diameter. Bloody fluid still oozed from the highest wound.

At 2 P.M. this oozing continued. The discolouration of the skin had not extended on the fore part of the body. The back was not examined. *Rigor mortis* was now well marked in the hips and knees; scarcely at all in the upper extremities.

POST MORTEM EXAMINATION.

The examination of the body was made 30 hours after death. Bloody fluid had continued to exude from the highest wound on the nose. From the mouth and nostrils a considerable quantity of frothy blood had issued. There was livid discolouration of the face, neck, and upper part of the chest, also of the dependent parts generally, except at the points where the pressure of the body had fallen; here the skin was pale. There was no swelling of any part except the right eyelids, and these were less swollen than during life. *Rigor mortis* was strongly marked in the lower extremities; less so in the upper.

On dissecting the skin from the nose, it was found that the three highest punctures on the right side had penetrated into the cellular tissue, which was infiltrated with dark blood. In the immediate neighbourhood of these wounds was discovered a small vein, but it could not be determined whether or not this vein had been punctured.

Brain and Spinal Chord.—In these organs scarcely anything abnormal was discovered. There was little, if any, unnatural congestion, either of the nervous centres themselves, or of the meninges. The lateral ventricles of the brain were filled with transparent fluid. The spinal chord, in its lower part, was softer than usual; in its upper part it was of natural consistence.

Lungs.—As the lungs lay *in situ*, they were observed to be less collapsed than usual. Being removed, they were found to present a healthy appearance in the anterior portions, but in the posterior parts they were excessively gorged with blood, being almost black on section, and exuding copiously a blackish fluid mixed with some air. The air tubes, large and small, throughout both lungs, were filled with a black frothy fluid, and the lining membrane was generally stained of a very dark blackish colour.

The larynx and trachea presented no unusual appearance, excepting dark-coloured staining of the trachea near its lower end. There was no sign of mechanical obstruction anywhere.

Heart.—This organ was healthy in structure throughout. The left cavities were contracted and empty; the right were filled with dark fluid blood, among which was a small quantity of very loose coagulum. There were no clots in the great vessels.

Alimentary Canal.—There was no swelling about the tongue or fauces; the œsophagus was healthy; the stomach presented patches of pale colour, alternating with patches of red, the latter formed by the aggregation of minute red spots. The intestines were natural.

The liver was of dark colour externally, and darker than natural on section; otherwise the organ was healthy.

The spleen was enormously congested, of very dark colour externally, and on section almost black; the substance was very soft, and from it exuded abundantly very dark blood.

The kidneys were of dark colour, both externally and internally, and the cut surfaces yielded, on pressure, dark coloured blood; otherwise the organs were healthy.

During the dissection it was noticed that the blood exhaled a peculiarly sour odour.

I may mention that, two hours and a-half after the man's death, an experiment was performed upon a mouse, by inoculating it with the blood that flowed from the wound. No effect was produced upon the animal.

In concluding the history of this case, I may be permitted to state, as a security for its trustworthiness, that my own notes were put upon paper immediately after the patient's death, and that these have been since confirmed, and in some points amplified, by a comparison with notes taken during the progress of the case by my colleague, Mr Gamgee. The statements relative to the man's condition before he was brought to the hospital rest upon the evidence of persons employed at the gardens."

Experiments with Venomous Serpents.

REPORTED BY DANIEL T. EVANS, ESQ.

The subject of animal poisons having, through the late casualty at the Zoological Gardens, attracted public notice, it occurred to me, when in the country, that the publication of some notes of the first of a series of experiments on animals bitten by venomous serpents might be both interesting and serviceable, and, upon my return to town, I proceed to embody them in writing, and place them at your service. Their origin was as follows,—In the course of last spring, I was informed by my friend, Dr Richard Quain, in a conversation upon animal poisons, that Mr Squire, the well-known chemist, had told him he was desirous of testing the efficacy of a powder called *Simaba Cedron*, in high repute among the Indians as a remedy for the bite of poisonous reptiles. No experiments as to its merits having been made in this country, I suggested a trial of it in the Zoological Gardens. Dr Quain at once concurred, and I wrote to the secretary of the Zoological Society for permission to try the remedy on animals bitten by serpents in the society's collection. This was promptly accorded, and I have pleasure in adding that the society, justly appreciating our motive, handsomely, and of their own accord, undertook all charges for animals and *matériel*—Mr Mitchell, the secretary, stating their "anxiety to afford all possible facilities for carrying out the investigation."

And here, in order to justify our proceedings to all who may read the subjoined report, and effectually to silence objections on the ground of cruelty, I feel it necessary to say that these experiments were not instituted in a spirit of vain and wanton curiosity, but with an earnest purpose to try the efficacy of a reputed remedy; and, that failing, in the hope to obtain such information as to the nature of the venom, and its mode of operation, as might extend our knowledge of animal poisons, and possibly suggest the means of counteracting their effect whenever occasion for so doing might unhappily arise. It is hoped and believed that the following notes will not be read without profit by the philosophic as well as the general reader.

The experiments took place on the 8th of July 1852, in the presence of Dr Quain, Mr Mitchell, Mr Squire, Mr Wyatt, and myself. The animals experimented on were rabbits, guineapigs, and sparrows; and the serpents to which they were offered were rattlesnakes, cobras, and puff-adders. The cobras, though tempted with birds, remained passive, and could not be provoked to bite. As some general characteristics appertain to all the experiments, it may be well, before entering upon the notes of each particular case, to throw them together, and lay them before the reader at once.

First, then, upon the introduction of an animal into their cage, the serpents became greatly agitated, raising themselves, and moving with a quick angular motion into attitudes of defence; sometimes, indeed, shewing fear, evidenced by retreat into the tank containing water below the level of their cage. This, however, soon subsided, and one of the the group, as if by general consent, was left watching the prey, and shewing a purpose to strike it. The others coiled themselves up, and thereafter shewed the immobility for which reptiles are remarkable, both puff-adders and rattlesnakes permitting the rabbits and guineapigs to walk over them with impunity. The attitudes and movements of the serpent intending to bite were very striking and beautiful. In the first place, he made, with the posterior half of the body, a bold curve, having a strong prehensile "purchase" on the floor of the cage, so as to secure a steady fulcrum for the rapid dart made at the time of the bite. The upper half of the body was raised some ten inches or a foot, the neck strongly arched, and the head, bent nearly at right angles with the neck, was poised directly opposite the prey. In such position the serpent remained a greater or less time (sometimes as long as twenty minutes) according to circumstances. During this interval, the slightest motion of the animal before him was followed by an instantaneous and corresponding movement of the head and neck of the serpent. The purpose seemed to be that of aim-taking, for the eyes were intently fixed upon the prey; but I am by no means sure that the snake, knowing that the latter cannot escape him, does not derive pleasure from this prolonged and intent gaze. At all events, in one experiment, where the head of a rattlesnake so engaged was sideways to the glass of the cage, and near it, I observed, and called attention to the fact, a remarkable vermicular motion along the course of the poison-gland to the opening of the angle of the mouth, which we thought might afford him pleasure, and this continued until the snake struck its prey. All these serpents seem to prefer striking when the animal is about a foot distant; when directly under and close to the head, they would not strike. The blow itself was very rapid; and although the united purpose of five observers was to detect the spot where the wound was inflicted, it was seldom any one succeeded. The puff-adders at first hissed violently, and swelled to double their usual thickness. One of them struck at us, but was foiled by the intervening glass. The cobras raised themselves and spread out their hoods. The rattlesnakes retired and then advanced, but emitted no sound; and the one that did not bite soon returned to his former passive condition. The bite of the rattlesnake, as will be seen, caused the most speedy death.

I now proceed to describe the peculiarities shewn by the animals on which we experimented. Some philosophers have denied innate ideas to man; these and some others have furthermore denied an instinctive apprehension of danger in animals. They say that of itself, as born, the hare has no dread of the hound; that its fear is acquired of experience. I concur in neither of these opinions, and think the latter altogether refuted by the conduct of the animals exposed to serpents in these experiments. Not one of the guineapigs or rabbits (which were all something under their full growth) had ever seen a serpent, yet, when introduced to the cage, shewed unequivocal symptoms of distress and fear. In some instances, they actually screamed before they were struck. They generally shewed restlessness at first; but when the serpent, intending to strike, poised himself in front, they became for a time, if not altogether, motionless. Is there such a thing as fascination? If by this is meant a pleasurable paralysis of the animal's powers, I think it more than doubtful; but a deprivation of the power of motion from terror may perhaps take place. All, however, that I speak to is a perfectly motionless condition of snake and prey, lasting several minutes. In one case, however, a rabbit (without being compelled by us to move and aggravate the serpent, for our exhausted patience necessitated the hurrying of the bite) in the course of a few minutes seemed to forget its danger, sat up like a squirrel, rubbed its face with its paws, and moved indifferently about the cage, treading upon other snakes without hesitation. I now proceed to detail the experiments, adopting the curt form and language of my notes.

First Experiment.—Puff-adder (*clotho arietans*) and guineapig. Struck by snake, and screamed at 8h. 54 min. A. M. Convulsions supervened in one minute. An infusion of the *Simaba Cedron* was poured freely down the throat, and the moistened powder applied to the wound. The convulsions (like a painful hiccough) gradually increased in violence and frequency. At five minutes after the blow, the pupil was insensible; the animal gasping for breath; its nose, lips, and feet (originally flesh-coloured) became first pale and then livid. In 8½ minutes the convulsions had ceased; the bladder contracted and emitted its contents, the quantity being very large for the size of the animal. In ten minutes the guineapig was quite dead. After this we could not induce another puff-adder to bite. We tried the cobras with a like disappointment.

Second Experiment.—Cascarilla rattlesnake (*crotalus horridus*) and guineapig. Struck behind the ear, near the jugular vein; dead before he could be carried to the table, certainly within a quarter of a minute. There were no convulsions. Unable to use the antidote. On a dissection roughly made by Dr Quain (for our object being to test the value of an alleged remedy, and not to note all the morbid appearances, we had not provided proper instruments) there was observed an effusion of dark-coloured blood below and around the wound; it extended from the jugular fossa to the spinal canal, and even within it, giving to Dr Quain an impression that the spinal chord itself had been injured more or less by the powerful fangs of the serpent—a conclusion which would account for the wonderful rapidity of death. One very interesting fact was witnessed in this experiment. I saw, for the first time, the beating of an animal's heart. It has been stated that the heart of Bellingham, the assassin of Mr Percival, beat for a considerable time after removal from the body. Several minutes after apparently complete death, the heart of this animal continued its pulsations. For every contraction of the apex of this organ, there seemed to be two of its auricles, which were gorged with venous blood. Generally there was much congestion of the vessels.

Third Experiment. — Same snake and a guineapig. Struck and screamed at 9 h. 26 min. 45 secs. The bite was on the left side, near the hind leg. In ten seconds the eye closed, and there followed a complete paralysis of the hind quarters. The remedy was applied. Slight convulsions supervened. Spasm of the diaphragm and gasping for breath within four minutes; pupil insensible in six minutes; animal dead in ten minutes. It is remarkable, that, in the last two experiments, there was far less convulsion than in the case of the animal bitten by the puff-adder.

Fourth Experiment.—On a sparrow.—A sparrow was inoculated with blood taken from the right auricle of the guineapig dissected, but it produced no perceptible effect.

Fifth Experiment.—Same rattlesnake and a rabbit.—Struck underneath the right thigh at 10 h. 4 min. 20 secs. The antidote administered and applied within a minute. The right leg was immediately paralysed, and it dragged. At 10 h. 7 min. 30 secs., both hind legs were paralysed. Panting for breath at 10 h. 8 min. He seemed to have partially recovered the use of his hind legs, and lost that of his fore legs at 10 h. 11 min. We thought him dying, without convulsions, at 10 h. 12 min., 15 secs. Subsequently, the animal, after recovering the use of his fore legs, and once more losing that of the hind legs, seemed to rally; and, to give him the better chance, he was removed from the reptile-house and laid on the grass in the sunshine, but he died at 10 h. 40 min., having survived the bite just half-an-hour.

Sixth Experiment.—Same rattlesnake and a strong rabbit.—Struck at 10 h. 30 min. 7 secs. in the ear, which immediately drooped. The bite perforated the ear completely, about an inch from the base. The rabbit shakes his head and ear; we place him on the floor, and he runs about. In ten minutes he seemed none the worse; he was, therefore, again put into the cage, and struck near the root of the same ear, about half-an-inch from the right eye, at 10 h. 48 min. The remedy was applied. He screamed as if from pain in about a minute, and cried a second time a few seconds afterwards. Slight spasms supervened at 10 h. 50 min.; he was quite dead at 10 h. 52 min. Lived just four minutes. Dr Quain dissected the animal five minutes after death, and found an effusion of dark blood in the course of the wound, such as described in Experiment 2. The fangs had perforated the carotid canal, and the vessel there contained a coagulum about half-an-inch in length, which nearly filled its cavity.

Seventh Experiment.—On a sparrow.—I inoculated a sparrow on the inside of the wing, near the heart, with blood from the wound caused by the fangs of the rattlesnake, but without apparent effect, for in fifteen minutes he seemed uninjured. This accords with Dr Russell's experiment by inoculation made in India. The keeper afterwards told me that one of the two sparrows died the next day, but not, as he thought, from the inoculation, for he found sparrows frequently die in the reptile-house when untouched by the serpents.

With this, the first series of our experiments closed, but we purpose a second upon stronger animals, such as cats, dogs, and goats.

These experiments ought to be, and, I hope, will be, considered equally interesting by the philanthropist and the medical philosopher. That they are not devoid of practical value, I hope to shew by the following remarks. The first observation that arises is, that the alleged remedy proved inefficacious. It may, indeed, have had some effect in the case of the rabbit that survived during half-an-hour. But it would, nevertheless, be unsafe to reject the *Simaba Cedron* as an antidote because it here failed, inasmuch as death followed so rapidly, that there was small opportunity for its action. It is not until it shall have been tried and have failed upon stronger animals, that, in the face of the experience of the Indians in hot climates, it should be repudiated. It is remarkable that the poison of the rattlesnake and of the puff-adder operated in a different manner. There was very little convulsion in the animals bitten by the former; they seemed to have their vital powers paralysed at once, to sink into a comatose state and die; while the spasms and convulsions following the bite of the puff-adder were violent, and increased in force and frequency till death ensued. The fourth bite of the same rattlesnake caused death in four minutes.

Some interesting questions arise on these experiments. What is the action of this deadly poison? Is it through the blood or the nervous system? There are presumptions both ways. The probability that it acts through the blood reposes on the observed fact of discolouration around the wound, and the coagulum found in the carotid artery, as described in Experiment 6. On the other hand, the presumption that it operates directly on the nervous system is strengthened by the following observations; *firstly*, by the extreme rapidity of death, the animal in Experiment 2 seeming to die instantaneously; *secondly*, by the observed effect of immediate paralysis of the limb nearest to the wound, followed by paralysis of the corresponding limb, though death did not directly follow (Experiment 4), and the drooping of the ear of the rabbit (in Experiment 6), simultaneously, as it appeared to us, with the bite. May not the poison act both through the circulation and the nervous system? For my own part, I think it does, and that any remedy, to be efficacious, must operate upon both.

One word in conclusion respecting the ill-fated keeper, Gurling. He it was who assisted at the experiments here narrated. His enthusiasm for his occupation was (not merely on that occasion, when it was noticed by those present, but on many other), very conspicuous; so much so, in fact, that in a copy of my notes, transmitted to the Zoological Society at the request of the secretary, I thought it right to mention him in terms of commendation. I seldom visited the gardens but he had some intelligence respecting the habits and peculiarities of the reptiles to communicate; and, for the sake of science, whose interests his observative habits would in some degree have promoted, as well as from a feeling of humanity, I lament his premature death. He has left a wife, as I am informed, totally unprovided for; and I hope, that, as she is deserving of sympathy, she will receive assistance both from the Zoological Society and the public. The indiscretion of her husband was her misfortune, not her fault, and he atoned for it by a sudden and a fearful death.

5 Elm Court, Temple, Nov. 1.

Some Observations on this subject in our next Number.

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PART I.

ORIGINAL COMMUNICATIONS.

ART. I.—*Remarks on the Diseases taking place at North Victoria, South Africa (see Table), enumerated in the Returns, Nos.* 1 *and* 2, *from* 1st *October* 1851 *to the* 31*st of March* 1852. By WM. T. BLACK, Assistant-Surgeon to the Forces, South Africa.

1. In reviewing these returns, the cases of *fever* will be observed to have increased from October to February, and to have diminished in March. The smaller number noted in December was owing to the absence of a large number of men on patrol to the Kei River, which continued out from 1st December to 16th January 1852, in which last month there were, however, more fresh cases than in December, though the men were absent the half of the month. These men, however, during this month of extraordinary weather thunder and showers of rain occurring every day, being exposed in the field, suffered very much from dysentery. These cases of fever occurred generally amongst adults and children, while the women were very little affected with the disease. Many of the cases assumed a congestive type, and probably received this determination from the same remote cause as the dysentery,—that is, of the more flux-like form.

Probably, the sudden change of the season, from long continued dryness and heat, for six months, that took place at the end of November, to comparative coolness and moisture, had the effect of reverting the mass of blood in the superficial circulation to the internal parts;—perspiration at th same time being suppressed, as was evident from the symptoms in such cases. In these cases of fever this passive congestion of the fluids may be considered to have been general; while it would have been confined to the partial circulation in dysentery;—and thus no outlet would exist to disburthen the heart. This state of oppression was wont to continue a long time, and no reactive fever set itself up; the tongue used to be found white; the pulse frequent but not strong; the mind oppressed and dull; appetite much diminished; the bowels irregular; the urine loaded, and dull pains complained of in the head, back, &c.

In the early stages, a vigorous emetic and purge was found to give great relief, repeated if necessary, which was generally requisite, according as the bowels got confined. In more advanced cases where the organic vitality had diminished, and the heart had less power to recover itself, and effusion was threatening to take place from the veins in the head especially, a mixture in camphor water of antimony, nitre, and salts, with a blue pill occasionally, so as to excite the excretory powers of the various organs, seemed to have a good effect;—with a blister to the head, or such parts as were most complained of.

2. *Ophthalmia* became common during windy and changeable weather, increased as to its cause by the dryness and quantity of dust carried about, before the ground became more saturated with moisture. It seems to have affected children less than adults of either sex, and consisted of common conjunctivitis, which subsided under the usual local applications, though requiring medicine to reduce a febrile catarrh by which it was sometimes accompanied. The neglected cases in adult Europeans proceeded to partial blindness; mercury given so as to keep the mouth affected led to great relief in the one, combined at a later period with quinine; and the restoration to a certain degree of health in the other, was accomplished by quinine mixture internally.

3. *Phrenitis* assumed, in its earlier stages, the form of congestion; in fact, being a more localised degree of the congestive fever before alluded to, and going on to effusion within the head, not of an active description. But if I had had an opportunity of a *post mortem*, in a fatal case, there would most likely have been found to be a jelly-like serum in the arachnoid and ventricles. These cases occurred, also, during the unusual weather of November and December, and in the younger cases, seemed to have had connection with the exposure of the head, without proper covering, to the hot sun. The

symptoms at the commencement were obscure and smothered; loss of appetite, costiveness, apathy of body and mind, dry skin, low pulse, coated tongue, slight heat of scalp, pupils steady and unirritable. An emetic and smart purge, given when first seen, appeared to rouse the circulation to more activity, and followed by a mixture of salts, nitre, and antimony, with blue pill or calomel at night, allowed the better play of the excretive organs, which seemed to lie dormant. Warmth to the feet and cold to the head, and, in later stages when effusion had seemingly taken place, blisters to the nape of the neck and scalp were employed. One or two cases were much benefited by powders of calomel and antimony, changed as expedient to James's powder, instead of the tartrate, when the latter caused too much irritability of the stomach and bowels; and nitre was also added when urine was deficient. Tea and coffee were found to be very injurious in such cases, generally increasing the congestive and giddy feelings in the head and not aiding free perspiration. No cases were fatal.

One in a European boy proceeded to hemiplegia of one side with dilated pupil, corresponding. Stimuli were then given, and mustard-poultices and hot water applied to the feet; and under the above treatment, persevered in strictly, recovery took place, though the emaciation was great. Adherence to a continued free perspiration seemed to be most advantageous. During convalescence afterwards, a sense of giddiness used to continue for some time, and a dread of the heat of the sun; but the appetite soon regained its power, and, with the assistance of quinine mixture, the nervous tone was restored, though slowly.

4. The cases of *Bronchitis*, *Pneumonia*, *Pleuritis*, and *Hepatitis*, all occurred from unusual exposure to the inclement weather of the beginning of summer, and took place chiefly amongst the coloured levies, except two attacks of the last disease, which happened to a European female, who, when a soldier's wife in India, had the disease very severely. One case of pneumonia, which terminated in purulent expectoration, died, and one of pleuritis in a black female likewise proceeded to the fatal termination.

5. The case of *Otitis*, was a European boy who had had otorrhœa for some years, and appeared evidently of a scrofulous constitution. It proved fatal from the spread of the disease to the brain, hemiplegia occurring before its termination. No treatment seemed of any avail.

6. The *Rheumatism* proved of ordinary character, and does not require any special notice. No case assumed the form of rheumatic fever.

7. *Urticaria* occurred rather severely in two cases, there being much constitutional disturbance, and was probably owing to checked excretion of bile, or some digestive secretions;—the circulation seeming to become overcharged and determined to the surface. One case required bleeding, in consequence of the blood being much accumulated to the head; and in the other, singularly after the eruption had come out, and the skin on the face and other parts was much swollen, sudden fainting twice occurred on the individual having occasion to go out under a hot sun in the middle of the day. On recovering from that state, the eruption had vanished, but the surface was bedewed with a clammy perspiration, and a sense of giddiness continued for several days after. Here I had reason to imagine the heart felt the effect of the change in the nature of the circulating fluid. The eruption and accompanying œdematous swelling made its appearance very quickly, so as to bring on urgent symptoms rapidly. Jalap and calomel, followed by saline solutions, contributed to relief of the symptoms.

8. The case of *Erysipelas* in a European came under treatment after the patient's return from the Trans Kei Expedition, and affected the scalp and face. Antiphlogistic remedies were first given; but as loss of appetite continued, with a tendency to delirium, wine and tonic mixture was substituted with marked benefit, and recovery took place.

9. Of *Phthisis* one case proved fatal in a Hottentot woman, and another in a European female, in its earlier stage, who was born in this country; but report alleges that the disease is common in the family, having been brought out from England by the father, and that one sister has already died from it. Nothing peculiar in the nature of these cases seems worthy of remark;—the fatal case had chronic laryngitis.

It might be a question interesting to settle whether European-Africans,—that is, those born in the country, ever acquire the disease here, and whether all cases that do occur are such as have been hereditary in the family before they left England. The climate, however, does not appear to be at all more favourable than in Britain for the relief of phthisis when once commenced. It is a very common disease amongst all of the Hottentot race, and carries off numbers of the Corannees beyond the Orange River. It is seldom, if ever noticed, as far as my information goes, amongst Caffres, Fingoes, or such allied tribes. In the Hottentot, it seems to arise from pure degeneracy of breed, combined with a reckless, careless mode of life, of similar character to that of the lowest Irish peasants. In the *post-mortem* examination of their children, I have seen almost every internal organ occupied with tubercular deposits before they were scarcely a year old, emaciation and destruction commencing in such soon after birth. Fatty liver I have also seen in a fatal case of a Hottentot woman some time ago. Scrofulous deposits in these people are also observed sometimes going on to abscess. In one case I saw it led to Empyema and death. Swelled glands in the neck, and suppuration in them, have also come under my notice at different times; and lastly, the leprosy, so common amongst colonial coloured people, may, without much doubt be placed in the catalogue as scrofulous.

10. *Catarrh*, during the unsettled weather of November and December, was common, and might have come more under notice during the latter month, had the full force remained in garrison. A considerable proportion occurred to children, especially the coloured. The symptoms varied from coryza to pulmonary catarrh, and demand no particular notice.

11. *Dysentery*, from the above cause, would also have shewn more cases in December and January than otherwise do appear, but a great many cases occurred amongst the men in the field, nearly one-half of these in the returns happened to coloured women and children. Three deaths took place, two in Fingoes and one in a Hottentot amongst adults, and one European child also fell a victim to it. In the first two cases the result took place in from six to eight days, from the great difficulty evinced in checking the discharges by medicine. The case of the Hottentot continued a month under treatment, and was progressing favourably, when a relapse took place of bad symptoms, which carried him off in three days, during which, owing to some superstitious feeling that his wife had poisoned him, he could not be induced to take either wine or medicine.

The disease, as manifested in the European and Hottentot, seemed to possess a more active character than in the Fingoe, and the general system participated in the disease at an earlier period. Calomel and opium generally afforded relief, from every six hours for the first twenty-four, and then followed by a dose of castor oil or rhubarb, and if the symptoms continued in a milder form after that, powders containing calomel, opium, ipecacuanha, and gum, were given three times a-day. In the case of the European women and children, the substitution of *hydrargyrus cum creta* for calomel in the powders seemed to answer better. The powders, in any case where no urgent symptoms prevailed, were commenced with at first, and it was only where these graver symptoms prevailed that the former treatment with the pills was resorted to.

In chronic cases, where local pain was complained of, blisters were efficacious, and in one case, in a European burgher, were the only means adopted with a scrupulous attention to diet, as any medicine whatever appeared to irritate the stomach and bowels to a remarkable degree, calomel included. The patient had formerly had the disease, and was very liable to a return of it. He had taken considerable quantities of medicine in previous complaints. This disease was remarkably prevalent amongst the Fingoes during the months of December and January, assuming more the form of a bloody flux than of an acute febrile disease. It was wont generally to begin gradually from a neglected diarrhœa, and more rarely to make its appearance suddenly, and then it was accompanied by acute symptoms from the first. In the ordinary flux-like form no other manifest symptom was present, except the constant desire to evacuate, and the matters consisted chiefly of pure dark blood. It did not seem to affect the general system much till after the loss of some quantity of that fluid, and the continuance of the irritation consequent on it; and then a febrile reaction used to be set up, and loss of appetite, thirst, and emaciation supervened. Before this would happen, a good dose of calomel, with jalap or rhubarb, usually put a stay on the progress of the disease, relieved the oppression of the colon, and the straining, and produced copious bilious stools. The patient was then wont to feel a lightness and relief to his sensations in the abdomen, and appetite returned.

In the further stages, when febrile reaction had been set up, calomel and opium, with or without ipecacuanha, seemed best adapted. Purges appeared then to irritate; and the pain was best relieved by a blister. The relief afforded at one stage by the unloading the liver freely would point out the nature of the disease as owing to obstructed portal circulation and the accumulation of the fluids in those vessels. Then again, as to the further cause of that, evidence is not so precise; that the portal circulation of the stomach was in the same condition might be inferred from the frequency of nausea and vomiting after meals. Amongst Europeans chiefly, in corresponding numbers, there was less amongst them of dysentery than among the Fingoes; but the women of the latter had it proportionally as much as the Europeans, and less of the dysentery.

In a former contribution I had endeavoured to more accurately define a theoretical cause for the complaint, which may be in general announced as originating in the peculiar diet that obtains amongst these people in winter time ; namely, a scarcity of vegetable food at that time, and an almost entire dependence upon their rations, as meat, meal, rice, coffee, sugar, &c., and amongst those not receiving such, upon meat and dried mealies, or Caffre corn. The less activity of the colic circulation, and the overloading of the portal circulation with albuminous matter, leads to stagnation of the former, which, becoming congested, eventually terminates in effusion of blood. In consequence of the colon being almost superficial in its whole extent, and the nearest intestine to the abdominal walls; supposing such a state of matters above mentioned as existing, any sudden exposure to cold or wet would at once generate an active disease from such materials; but should no such cause have operated, then the disease begins gradually, and runs a course as previously pointed out.

Amongst the hostile Caffres during war time, dysentery is very common, and carries off numbers. Here the diet is necessarily restricted to almost meat alone, especially when on the war path; the captured cattle, goats, and sheep, being slaughtered as required on the road. In both cases after their gardens have begun to produce crops, cases of the disease gradually lessen and disappear till the next recurring spring. During the summer and autumn they live almost entirely on fresh vegetable diet; the meat then being boiled up into a mess with the articles which they use, as pumpkins, green mealies, mealy stalks, beans, &c. Amongst Europeans this cause may prevail, but to a less extent, as some cases amongst them shew the same form of dysentery; the scarcity of fresh vegetable food at that season of the year influencing them in the same manner as the Fingoes, though, from having better means, they can purchase such articles as are good substitutes. I may remark that costiveness in these cases precedes the advent of the disease.

12. *Dyspepsia* ranks as the most numerous class of complaints in the return, and occurred consentaneously with the greater prevalence of other diseases. It was much more common amongst Europeans than among coloured people, and in them of a more decided type, and affected both the women and children, as well as the adults. As this complaint was more common amongst Europeans, so was dysentery more so amongst the coloured people. There was generally a want of appetite, and after the morning meal nausea and rejection of the food used to ensue, with a sensation of relief following, and some time elapsed before the person's appetite did again return.

Vomiting of the evening meal used also to take place, though not so often as the morning one. No other symptoms appeared; no pain, no further disorder of stomach; though the bowels were perhaps more costive than usual. If allowed to continue for some time the bowels would become affected, and diarrhœa take place, a mild form of dysentery. A very light breakfast, without meat of any kind, persevered in for a time, along with abstinence entirely till the evening meal, would in some cases cause the disease to cease.

Hot weather generally more predisposed to it than cold.

Accompanying this in some cases, but at different times, a sense of giddiness in the head prevailed, especially during the day or in the sun, so severe as sometimes to induce the individual to fall down. The complaint is one which old residents at this place state generally to be common at that season of the year; but I had seen it also at Fort Hare during the war before. I am in doubt whether to charge its origin to functional derangement of the liver, which is highly probable; though in some cases in children affection of the head would shew itself after neglecting to attack the dyspeptic symptoms, by heat of scalp, drowsiness, and other signs, as alluded to in milder cases of phrenitis.

There generally seemed to be an increased secretion of gastric juice, as such acid fluid was rejected before the food. If the liver was in fault, then I should conjecture that a similar state of matters with the portal circulation existed as in dysentery.

Fruit, fresh vegetable, and amylaceous food, was generally borne well; in fact, the reverse description to what had been in general use continuously before. Calling upon other secreting organs than the liver and gastric glands for reaction, as the salivary system and intestinal glands, seemed to act by way of metastasis to the others.

The *diarrhœa* also proceeding consentaneously with the other season diseases, appeared generally of the bilious kind, and was most common in children, both white and black.

13. Nineteen cases of *gunshot-wound* came under the course of my immediate treatment during the six months;—some, however of the wounded natives prefer trusting themselves under counsel of their own witch-doctors. In natives, these cases usually proceed very favourably, if common attention to cleanliness and position, in case of fractured bones, be paid. Simple water dressing, warm or cold, according to circumstances, with lint, seemed to answer well, and splints were seldom required to the extent usually supposed necessary, and were little borne when so used. The treatment of the cases

of fracture with gunshot-wound appeared best carried out by attention to position, instead of putting the damaged limb to any restraint by splints, which irritated and gave pain to the highly swollen state of parts which in these cases supervenes. Warm water dressings and fomentations fulfilled the intentions best, and the swelling after a time soon subsided; and in no case had any extensive sloughing or formation of abscesses formed,—the wounds gradually cleaning, like those of simple flesh wounds, but of course continuing open much longer for the discharge of pieces of bone, and the matter thrown out in the course of its regeneration. The separation of sloughs from the wounds seemed to take place at various periods, some being earlier, and others from five to ten days later,—the state of the weather appearing to influence the process much, warm steady weather healing quicker than in cool unsettled. Fracture of the thigh with gunshot-wound has been treated by merely laying the limb on its outside, with the knee-joint bent. Fracture of the leg has been treated in a similar way, and that of the humerus by supporting the fore-arm in a sling, with a splint for the arm to rest on,—no splints being used to the fractured bones themselves, but only bandaging sufficient to retain dressings.

Amongst some of the curious cases of gunshot-wound which I have seen during the war, I may mention the following. A ball having entered the chest between the stomach and situation of the apex of the heart, obliquely, it was supposed; the wound healed; the man had recovered when last seen, but the lodgment or course of the ball was never discovered. In another, the ball entered the right groin on the outside, and appeared to course obliquely in towards the abdomen. Recovery took place, but the ball was never detected when last seen. Death took place in another case from injury to the lungs, the ball entering at the left ear, and was cut out of the integuments over the right hypochondrium. Death took place from hæmorrhage before assistance could arrive after the patient's admission into hospital, from a gunshot wound of the right thigh, where it was discovered after death that the femoral vein had been cut through, though not the artery. No hæmorrhage ensued till the fatal event.

Officious surgery, in a case of gunshot-wound, with fracture of leg, I saw, evidently produced mischief. The medical attendant was partial to strapping, plasters, pads, and used various vegetable medicinal powders, as rhubarb, bark, and charcoal, &c. Secondary hæmorrhage from the tibial artery came on, and was only restrained by powerful pressure, which brought its consequences, intrinsic sloughing; and for months the union of the bones was delayed. The entire loss of substance inflicted by a ball on a bone, causes a great difference to exist between such and common compound fracture from a blow. Splints are necessary in the latter, to prevent riding, which leads to deformity, slowness of union, and constitutional irritation, but less necessary in the former, as shortening must take place, and a nearer approximation of the ends of the bones would lead to earlier union.

14. The case of *Epilepsy* in a European officer of the North Victoria Levy, is a little singular, from the individual being always liable, when in the lower country of Albany, or Beaufort, to asthma, which only is temporarily relieved by medicine, but entirely leaves him when stationed in the upper country of Victoria or Cradock. In lieu of the asthma, however, he has been subject several times to a species of hysterical epilepsy, especially after over-exertion of mind or body in the several arduous duties which he has had to undertake since the commencement of the war in this part of the country. On the occasions in which I saw him in these fits, the plentiful effusion of cold water on the face and head from a large jug sufficed to arrest the continuance of the complaint. Smoking the seeds of stramonium generally relieved the asthmatic fits when obliged to be on duty down below. His father is also a victim to the asthma under similar circumstances, and hence, though formerly living in Lower Caffraria as a missionary, has fixed his residence in the Cradock district.

15. *Worms* very generally infest people residing on the frontiers of the Eastern province, these parasites being prevalent amongst soldiers, regulars as well as irregulars, and both amongst white and coloured. The frontier Caffres also are much troubled with them; and probably the origin of the complaint amongst the stranger inhabitants may arise from the propagation of the ova from the former to the latter. A predisposition, however, would seem to be necessary, consisting in a poor and unvarying diet, and the scarcity of salt in the food.

Tænia is the species most commonly met with.

16. One of the cases of *ulcers* was a troublesome varicose ulcer of the leg, which was finally healed by the application of a blister over the sore, which changed the action of the vessels of the part entirely. Cicatrization readily followed, and the part has continued sound now several months. Previous to the application of blister, various ointments and washes were tried without any permanent effect.

Remarks on Prevalent Diseases at Whittlesea and Shiloh, from 1st April to 30th September 1852.

The early months of this period seem to have been more pregnant with disease than the later, as common fever, ophthalmia, rheumatism, and catarrh, engrossed more cases in the first three months than in the succeeding three months. One circumstance must, however, be taken into account, namely, the progressive diminution of the force of the district during this period. The weather also during the whole winter was steady, and generally fine, though great alternations of temperature were sometimes experienced, but did little harm from the dryness of the air. April was also a much wetter month than any that succeeded, and probably the change at the end of that time from moisture to comparative dryness may have had some effect on the occurrence of disease.

Dysentery had a prevalence to a slight extent, exclusively for June, July, and August, which is probably to be attributed to the nature of the diet. As most of the cases occurred at Shiloh, it may have been excited by the effluvia from the animal remains and other nuisances that had been allowed to collect about the premises, which, however, were removed on proper representation being made, and no more fresh cases occurred.

Measles will appear to have commenced in July, and exhausted its epidemic violence about the end of September. At the same time there arose an increase in the number of catarrhal cases, chiefly amongst adults, attributable probably to the peculiar state of the atmosphere, thus predisposing to affections of the respiratory mucous membranes.

1. The *fever* during the six months offers nothing peculiar in character, besides what occurred in the preceding period. One rather serious case, not however entered in these returns, occurred in a private patient, a shopkeeper of Whittlesea, aged about forty-five, and rather stout. The disease made its onset suddenly with shivering, and when developed there was delirium, tending to be violent, restlessness, very dry brown tongue, thirst, costiveness, dry muddy skin, very scanty dark-coloured urine, with pains in the neck, shoulders, and back, very severe. The pulse was at first full, and had an intermission, which went off, however, after the heart was relieved. He was bled three separate times in the course of two or three days, just to incipient syncope, which soon supervened, so

that not much blood was drawn altogether. The blood was buffy, and the fibrin and serum of a bilious colour. Delirium ceased after each bleeding; and when reaction took place after each, the fever had abated, the tongue become moist and white, there was less thirst, and the pains of the back lessened. Between each bleeding purges of calomel, followed by neutral salts, were given. The stools produced were excessively dark and offensive. After the last bloodletting more repose was gained, and the brownness of the tongue did not so soon return; but as all the excreting organs seemed obstinately averse to perform their functions, powders containing calomel, nitre, antimony, rhubarb and camphor, in small doses, were commenced, and given every four hours, which produced the desired effect. Profuse perspiration set in; the urine became more plentiful and lighter coloured; the bowels were kept open, and the intestinal secretions maintained; sleep became more prolonged, the thirst less, and the stomach bore nutriment better, which it was now thought advisable to commence with. As the violence of the disease was now broken, the powders were gradually given less often, and when the mouth became affected with the mercury, were stopped, and occasional purgatives and saline diaphoretics given. Antimony was useful as an addition to purgatives, as it obviated any tendency to succeeding costiveness, which frequently is the case in persons so disposed after taking purgatives. The stools had thus regained their natural colour and consistence, and the appetite had returned. Convalescence, however, was slow, and during its course taraxacum in camphor mixture, and laxative pills were administered.

This case was under direct treatment about a fortnight. Its nature, I suggest, was that of bilious fever, as the liver seemed the most affected organ, not from any direct symptoms during the height of the disorder, but judging from the colour of the blood, the muddy countenance and skin, the nature of the stools brought away by mercurial purgatives, and the colour of the urine. The delirium probably under this view arose from retention or absorption of bile in the circulating fluid. Costiveness for some time preceded the attack. The individual was of regular habits, and no drinker. Notwithstanding the apparent want of tolerance for venesection, shewn by early supervention of faintness, I judged it expedient to repeat it, from observing the good effects of the subsequent reaction, and that under it the intermission of the pulse disappeared. Camphor was added to the powders, trusting that it would aid the diaphoretic effect, give repose, and tend to keep up the reaction that followed the venesection.

2. The case of *Phrenitis* which died, was of the same character as those noticed in the report for the foregoing six months, and had advanced to decided effusion in the head before medical aid was called in. No fever existed, but a white tongue, excessive costiveness, total apathy of mind, and impaired sensibility and motorypower. Croton oil was obliged to be given to move the bowels.

3. A few cases of *bronchitis* and *pneumonia* occurred in the early period of the rubeolar epidemic, and which were probably produced by a similar state of atmosphere. These all occurred in adults. The peculiar expectoration of pneumonia was present, and the disease appeared to be circumscribed in its extent in the lungs. Neutral saline and antimonial mixtures were administered in every case with benefit, no recourse being found necessary for mercurials except as adjuncts to purgatives at the commencement.

4. One of the cases of *hepatitis* occurred in the same female subject as in the previous six months, and she fortunately got over this last and most severe attack. The details and remarks on it have already been forwarded. Suffice it to say, that mercurials given as adjuncts to purgatives seemed much more beneficial in this case than when given to produce a constitutional effect, which appeared more of an irritating nature on the liver than otherwise.

The other case of hepatitis proved fatal in a chronic state, which I conjectured had proceeded to abscess, as the lung became involved, with dyspnœa, cough, expectoration of muco-purulent matter, &c. The case took place in a bastard Hottentot, who had been sick some time before applying for medical aid. I regretted I had not a sufficient supply of medicines, of those especially most suitable to such a case, as I think a good deal might have been done with other means than I possessed to have averted or stayed the fatal termination. Mercurials were here also productive of no benefit in small doses so as to affect the system, and brought on an increase of pain instead of relieving it, but as addition to purgatives they were more valuable. The disease was at first mitigated considerably, and much debility remained; but having no other tonics or stomachics than quinine and cinchona, the former brought on a return of pain, and the latter caused constipation when given to increase the appetite and strengthen the system. Sarsaparilla had a good effect; but the supply coming short, no permanent benefit from it was obtained. A return of the active symptoms while in a state of debility, and the involvement of the lung, carried away all hope of the patient recovering, and he finally expressed his opinion as to the uselessness of persevering in taking medicines. No *post-mortem* examination could be obtained.

5. *Rheumatism* is a very frequent complaint in this country, and is often of a serious nature. Colchicum and carbonate of potass I have generally tried with better effect than anything else, chiefly in cases where there is fever. None of these cases require any notice except one in a commissariat issuer, who had been subject for several years to attacks of it every now and then, and had been ill with it during the previous six months, but had recovered to a very good state of health. He had, however, since taken to drinking, and, about the end of July, was suddenly seized with a fit under which he fell down; and on the return of reaction, as apoplectic symptoms manifested themselves, by some delirium, faltering of speech, loss of memory, loss of proper action of one side of the tongue, and pain of the occiput; he was bled to relief of these symptoms, which required to be repeated next day for a return of the same. On the third day, rheumatism fairly set in with sub-acute fever, the head symptoms disappeared entirely, and local affections of the extremities then commenced. Colchicum and carbonate of potass were administered with considerable benefit, and the rheumatism much abated, and, in fact, he became quite convalescent.

About three weeks after the commencement of the above, on 12th August he was suddenly taken with symptoms of metastatic rheumatism of the heart or diaphragm and the stomach. These symptoms under treatment disappeared; but the disease afterwards ran a course through almost every joint and fibrous structure of the body. As, before this, the supply of colchicum had failed, my only recourse was to compound squill pill with blue pill, but chiefly to nitre in cream-of-tartar water, when the acute symptoms were present, and to bran poultices for the local inflammations. The urine became, under these saline medicines, clear and plentiful, from being scanty and muddy. Convalescence was assisted by quinine mixture, but most benefit resulted from sarsaparilla with iodide of potassium. By 15th September he was restored to a fair state of health, though much crippled from the effects of the disease on the joints. A noticeable point in the case is the supervention of the rheumatic fever after twice venesection;—a point on which I am not able to offer any reasonable explanation.

6. *Measles*, for several months before its arrival here, had been prevalent in other surrounding parts of the Eastern province, as Beaufort, Cradock, Graham's Town, &c., where many cases proved fatal from these subsequent effects. This

disease attacked also the frontier posts in this part of the country some time before it reached Whittlesea, as Furness Post, forty miles off, and Kamarstone, twelve miles hence. Both white and black were attacked, adult as well as children ; but the most numerous cases were amongst the latter. Measles in this colony is only an epidemic at intervals of years, and does not prevail at all seasons, as it does in England, this being the first epidemic since my arrival in the colony about six years ago. Coloured people, old or young, do not seem to suffer much from its invasion ; and they do not consider it necessary, nor do they find themselves obliged, to keep to their huts or take much medicine, so that the majority of actual cases amongst them, never came under my cognisance unless they were more severe than the generality. Whittlesea was first attacked by the epidemic, and subsequently Shiloh. No deaths took place to my knowledge in either locality, but some might have occurred amongst the Fingoes, who are rather careless and indifferent about life.

The disorder attacked two adult European females, one of whom had it when young. At the commencement of the attack in one where, before the eruption came out, which was tardy, considerable dyspnœa manifested itself, with some other threatening symptoms of affection of the lungs, venesection was adopted with marked benefit, and soon after the skin became affected, and in a few days the disease had run its course, and that mildly. In the other case where no such call shewed itself for bleeding, the disease was more protracted, and the eruption slow in appearing, and the current and subsequent chest-symptoms troublesome, till a spontaneous menorrhagia took place, that gave much relief.

Can any analogy be traced between the former of these two cases, and the previously detailed one of rheumatism ? Both are similar in the circumstance, that after the employment of venesection, the existence of a latent disease, that already pervaded the system, became manifest. Did the loss of blood diminish the vital resistance of the nerves and vessels, which had power sufficient before to counteract the morbific molecular changes, and allow the latter to usurp the dominion over the healthy vital forces. Lithic acid in the one, and the rubeolar poison in the other, when retained in the circulation, produced in the first case symptoms of apoplexy, as occurs sometimes in gouty subjects, when the secretion of urine is checked,—and in the second engorgement of the lungs ; each implication being determined by the peculiar affinities inherent in these morbid constituents of the blood for certain internal organs, when their egress is prevented by the general depuratory excretions of the kidneys and skin.

The most useful treatment amongst the children seemed to be an emetic in the sickening stage, followed by compound jalap powder; and if the eruption was slow in appearing, James's powder, warm bath, and hot drinks brought it out freely, and relieved the feverish oppression. If, after the subsidence of the eruption, any head or chest symptoms shewed themselves, compound jalap powder, followed by the promotion of free perspiration by the above means, sufficed to relieve them. For adults a mixture of antimony and nitre seemed of most consequence during the course of the disease, after the preliminary evacuation.

7. The case of *Phthisis* died 1st October, after six months' duration of more decided symptoms, though ill since her arrival at this place in January, from the same cause. Cod-liver oil was tried, and found successful in ameliorating the disease for a time, giving strength, improving the bodily appearance, and lessening the cough. After about three weeks use of it, however, some dietary imprudence was followed by smart diarrhœa, and afterwards the oil could never be resumed, from its affecting the stomach and bowels. The course of the disease afforded nothing out of the usual run of such cases. Medicines for diarrhœa and cough required to be changed, as their continuance proved they had lost their efficacy. As a cough-pill, hyoscyamus and ipecacuanha seemed to be of more service, and for a longer period than others I had the means of trying. Decoction of cinchona at first served the double purpose of checking diarrhœa, and increasing the appetite. Laudanum was, however, the final resource after all others had lost their effect, both for the cough and diarrhœa. Quinine mixture was daily given for the latter periods; and if administered just at the commencement of the accession of the hectic fever, had some effect in shortening its course, and indeed of altogether checking its supervention for that time.

Another case of *Phthisis* subsequently has developed itself, and is now under treatment in a European girl, aged 14, of dark complexion. She had the measles during the epidemic when it visited Shiloh; and as they left her, some suspicion arose that the constitution had received a severe injury from no convalescence taking place from that disease. Various minor disturbances of the economy supervened, as dyspepsia, irregular bowels, spurious uterine pains, as if menstruation were about to commence, some cough, which was merely attributed to the reliquiæ of measles. Most of these adventitious symptoms disappeared under treatment; but the cough became more developed, and apparent debility remained with considerable constitutional debility. Still, not suspecting phthisis, quinine mixture was given, as I had no milder form of tonic, as there was great loss of appetite, and much mental and bodily prostration; but it aggravated the symptoms without increasing the appetite. Stethoscopic examination, however, revealed mischief in the lungs; and phthisis being now conjectured to be the real state of matters, treatment was varied in consequence with benefit. A cough-mixture of hyoscyamus, ipecacuanha, and soda proved useful, acid remedies of ordinary kind being found hurtful, both to the cough and the stomach.

The known views of the prevalence of excess of acidity in consumptive persons, and the late discovery of a peculiar acid secreted in the air-cells of the lungs, may tend to corroborate the above observation on the treatment of this case. Cod-liver oil was commenced with, in one drachm doses three times a-day, and Iceland moss was given as a medicinal nutrient, to which a few grains of columba were added once a-day, with the effect of restoring the appetite. The cough has now subsided from its prevalence almost every hour during the night, the evening paroxysms have abated, the strength and appetite have been improved. In both these cases diuretics were found to be injurious, producing symptoms analogous to strangury. In each case, was distinctly observed the vermilion border to the edge of the gums, a known characteristic of a phthisical constitution.

8. On the subject of *Dysentery* I may refer to cases already forwarded, for information on the disease as it occurred during this period, and for the theoretical remarks appended thereto. I have little further to add, but to confirm my opinion concerning the use of mercurials in this complaint, and to suggest that their curative effect here may arise from their setting up a counter-irritation in the liver, antagonistic to the irritation of the disease in the colon; and this effect, in my observation, is superior to the mercurial irritation of the whole system for the relief of the disease. It does not appear at all necessary to affect the gums with mercurials in these cases; and those cases in which I have seen the gums affected, have not betrayed much benefit derived from the medicine towards the control of the disease. Amongst a few cases, I may mention that I had ordered powders containing hydrargyrus cum creta to be taken three times a-day, for a mild though obstinate case of dysentery in a female, and the mouth became affected, without influencing the disease at all. But, observing that single powders taken during exacerbations of the disease generally relieved them, they were

ordered to be taken under the guidance of the patient's feelings entirely. The mouth did not become again effected, and the disease subsided under this mode of treatment.

In a case where I had found it necessary to administer blue pill to affect the system, and carefully noticing its progress, it appeared that an irritation of the liver was amongst the first symptoms induced, manifested by pain and heat in the region of that organ, which was not concerned in the disease, increased on motion or coughing, pain of the shoulder, and some nausea, and that subsequently the gums became affected, and a perspiration broke out, while the hepatic symptoms subsided. In this case, also, the more troublesome effects of the mineral in the mouth and other parts were got rid of by inducing copious perspiration after the necessity for the mercurial influence no longer existed.

In children I have generally found the greatest benefit to arise from giving a purge of calomel and rhubarb, before giving hydrargyrus cum creta, which was combined with Dover's powder.

The administration of too much opium I have also seen to be injurious; for, when the system gets under its influence, its astringent effect passes off, and a sedative and relaxing one takes place, and the natural symptoms, which ought to guide one day by day in the administration of remedies, become concealed and masked under the state of narcotism. I hence imagine it to be an inexpedient rule to go by in the treatment of this disease, viz., treating the affection by general rules in every case, without regard being paid to symptoms; for the symptoms become as much a guide to judge of the intensity of the disease, and to note the effect of remedies by. As I have neither found reason to push the influence of mercury to affection of the system in every case, so neither do I imagine any benefit to be attained by narcotising the patient with opium.

The general system should be kept as much as possible from participating in the disease, as in the influence of the remedies given to cure it; and the vital sensibilities must be kept as much awake as possible, both for the purpose of noting the intensity of the morbid action, and for allowing nature opportunities of recovering lost ground, by recruiting its powers for repairing the breaches made by the disease, when held in check by medicines. I wish to maintain that nature is the sole curer of the destruction caused by the processes of morbid actions, and that medicines by their more powerful inherent forces than those of the healthy vital, are to restrain the former within such bounds as the latter can act for restoration. Can medicines build cells, fibre or muscular tissue ? Can they create new nuclei from their own materials for cell regeneration ? Can they hence give material to form a new mucous membrane ? Can they supply any gland in the body with new secretion, or reanimate the vital spark when it has fled ?

9. During this period of the year, the *Dyspepsia* has shewn no season peculiarity, as it did last year. A case or two, with remarks, have already been forwarded. The few most marked cases all seemed unequivocally to be of the bilious description, but unaccompanied with the vomiting, so characteristic of the form of dyspepsia, during the October and November of the preceding period.

10. Disorders of the *uterine* system and of the *menstruation* are, I understand, of very frequent occurrence through the whole country, both amongst English and Dutch females. It may be attributed, in all likelihood, to imprudent exercise and employment in the early months of pregnancy, which, of course, in a rural population, may be easily imagined. Amongst native or coloured females, disordered menstruation, in most cases, arises from their custom of washing clothes and linen, sitting or standing in the river, whether for themselves or others, as they are the sole washerwomen of the country ; European females delegating such work to them entirely. The heat of the climate may contribute a quotum to the same effect. The common practice of European females riding in this colony from one farm to another, performing other journeys on horseback, as long as what most males could do, I think is among the chief causes of bringing on abortion, or giving a tendency to it. The distance or absence of medical advice and assistance, again precludes the victim of abortion from observing due precautions requisite after such an untoward event; and the consequence is a chronic disease of the uterus is gradually developed, which at last gets so far ahead, as to become very difficult of treatment. In such circumstances barrenness generally succeeds, and dysmenorrhœa is a monthly occurrence. In this state, two or three cases already exist in this neighbourhood.

A case, illustrative of the truth of the above remarks, occurred in a female at Whittlesea. Being in about the third month of pregnancy, she continued riding out occasionally as usual, and flooding took place, with abortion of one ovum ; and in the interval between this and a similar train of events with the second, as she happened to have twins, she fancied herself well enough to undertake some arduous household duties, which made the second attack more unmanageable than the former. From employing some household remedies at the commencement of the second abortion, subacute inflammation of the womb set in, which, however, was afterwards subdued. She had also, during this illness, hysterical abdominal symptoms, requiring separate treatment, and after a protracted illness, recovery took place.

11. Personally I have been acquainted with the histories of four cases of *hepatic abscess* in this colony, and do not doubt but they are common. Two cases were idiopathic, that is, resulted from uncomplicated inflammation of the liver; one of which proved fatal by bursting into the peritoneal sac, the abscess being situated between the diaphragm and upper surface of the liver; and the other brought on the death of the patient by exhaustion and debility,—the abscess having opened a passage into the colon.

The other two cases were complicated with dysentery, which was the antecedent disease to the affection of the liver, which began insidiously, no striking symptoms manifesting its approach, and only later on shewed signs of its presence by typhoid or initiative fever, and some obscure local pain.

In one of these cases the abscess had perforated the diaphragm, and invaded the lower lobe of the lung, giving rise to pneumonic symptoms, which masked the local hepatic signs. As no large opening had been made into a bronchial tube, so no large evacuation of purulent matter took place. In the other case the abscess was entirely confined to the substance of the liver, but its upper wall was the diaphragm. Both these cases died of *asthenia,* and the dysenteric symptoms had almost entirely disappeared.

Post-mortem examination disclosed the above conditions of the disease, and the fact that the colonic lesion had been almost cured, as no ulcers in a state of activity were discovered, and these much fewer than expected. Both these men were drinkers, but not drunkards; and both during the treatment for dysentery had administered to them considerable quantities of mercury. I am led to imagine, from what I have already advanced on the action of mercury on the liver, when given in small doses, that this treatment may be no inconsiderable cause, when carried too far, or when too prolonged, of affections of that organ in the sequel of dysentery; and from what I have seen in this colony I have more reason for such a belief than that the absorption of pus from the ulcerated colon is the sole cause of hepatic abscess. Purulent deposits are very different from abscesses from inflammation, both in symptoms and pathological appearance, and could, I should imagine, be scarcely mistaken for the other.

W. T. B.

No. I.—General Return *of Sick Officers, Men, Women, and Children, of the Irregular Force of the* North Victoria *District, distinguishing White from Black People, from October* 1, 1851, *to March* 31, 1852.

		Strength.				Febris, Com. Contin.	Phlegmon.	Paronychia.	Ophthalmia.	Phrenitis.	Cynanche (Tonsia Pharyn.).	Pneumonia.	Pleuritis.	Bronchitis.	Hepatitis (Acute, Chron.).	Enteritis.	Otitis.	Rheumat. (Acute, Chron.).	Lumbago.	Erysipelas.	Urticaria.	Hæmaturia.	Phthisis.	Catarrh Ac.	Dysenteria (Acute, Chron.).	Paralysis.	Dyspepsia.	Epilepsia.	Colica.	Diarrhœa.	Mania.	Vermes.	Syphilis.	Gonorrhœa.	Hernia Humor.	Sarcocele.	Hernia.	Dysuria.	Tumor.	Vulnus, Gunshot.	Vulnus.	Contusio.	Ulcus.	Fractura.	Morbus Cutis.	Cephalalgia.	Ozena.	Aphthæ.	Parturitio.	Hysteria.	Amenorrhœa.	Dysmenorrhœa.	Menorrhagia.	Ambustio.	Total.
		Officers.	Men.	Women.	Children.																																																		
White.	Officers,	3	...	...	...																1						3			1											1														6
	Men,	...	59	...	...	7		1	6					1	1			4	2	1	1			2	9	1	14		1	1			1	1				1			1	2													58
	Women,	...	...	17	...	2			7						2	1		1					1	5	2		13		3			3					1						2			1			1	1	1	2	1		50
	Children,	...	...	...	40	15			1	1							1							5	9		10	1	1	8		2													1		1	1							57
Black.	Officers,	23	...	...	...	3				2	1														5		4	1		2		1				1						1		1		1									23
	Men,	...	1070	...	...	17	3		5	1	1	3	1	2	1			9	1			1	1	10	13		14		4	5		2	3	2	1	1		1	2	18	2	2		1	3										130
	Women,	...	...	523	...	2			3	2			1	1				2					1	5	10		8		2		1	4								1	1				1						1				46
	Children,	...	...	...	1525	11							1											9	13					6			1																					3	44
						57	3	1	22	6	2	3	3	4	4	1	1	16	3	1	2	1	3	36	61	1	66	2	11	23	1	12	5	3	1	2	1	2	2	19	5	5	2	2	5	2	1	1	1	1	2	2	1	3	414

W. Black, *Stiff-Assist.-Surgeon.*

No. II.—General Return *of* Diseases, *arranged according to the respective Months they occurred in, of the Provisional Force of the* North Victoria *District, from October* 1, 1851, *to March* 18, 1852.

Month.	Number of Days on which Rain fell.	Febris, Com. Contin.	Phlegmon et Absces.	Paronychia.	Ophthalmia.	Phrenitis.	Cynanche (Tons. Pharyn.).	Bronchitis.	Pneumonia.	Pleuritis.	Hepatitis (Acute, Chron.).	Enteritis.	Otitis.	Rheumat. (Acute, Chron.).	Lumbago.	Urticaria.	Erysipelas.	Phthisis.	Hæmaturia.	Catarrh Ac.	Dysenteria (Acute, Chron.).	Dyspepsia.	Epilepsia.	Colica.	Diarrhœa.	Mania.	Vermes.	Syphilis Primitiv.	Hernia Humor.	Gonorrhœa.	Sarcocele.	Dysuria.	Tumor.	Hernia.	Vulnus, Gunshot.	Vulnus.	Contusio.	Ambustio.	Ulcus.	Fractura.	Morbus Cutis.	Aphthæ.	Dymenorrhœa.	Amenorrhœa.	Menorrhagia.	Cephalalgia.	Ozena.	Hysteria.	Parturitio.	Paralysis.	Total.
Oct. .	6	4	...	1	3	1	...	...	1	1	1	...	1	3	...	...	...	1	...	3	6	2	...	...	1	...	...	...	1	...	...	1	1	...	3	...	2	2	1	...	...	...	...	1	...	...	...	...	...	...	41
Nov. .	9	10	...	...	5	4	...	2	1	1	1	...	...	4	2	1	...	...	...	10	24	24	1	2	5	1	1	1	...	...	...	...	...	1	...	2	1	1	...	...	2	1	2	...	1	...	...	...	...	...	111
Dec. .	17	9	...	...	4	1	...	1	1	...	...	1	...	1	...	1	...	1	...	8	20	17	1	2	3	...	2	1	...	...	...	...	...	...	4	1	...	...	...	...	1	...	...	...	...	2	1	1	...	...	84
Jan. .	4	11	1	...	5	1	...	...	...	1	1	...	...	2	1	...	1	1	...	8	7	14	...	2	8	...	3	2	...	1	...	...	1	...	3	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	76
Feb. .	13	14	1	...	3	...	...	...	...	...	1	...	...	4	...	...	...	...	...	6	5	2	...	3	4	...	2	...	...	1	1	...	...	...	...	...	...	...	...	1	1	...	...	1	...	...	...	...	...	...	50
Mar. .	5	8	1	...	2	...	2	1	...	...	...	...	...	2	...	...	...	...	1	1	...	7	...	2	2	...	4	1	...	1	1	1	...	...	9	2	2	...	1	1	1	...	...	...	...	...	...	...	...	...	53
		56	3	1	22	7	2	4	3	3	4	1	1	16	3	2	1	3	1	36	62	66	2	11	23	1	12	5	1	3	2	2	2	1	19	5	5	3	2	2	5	1	2	2	1	2	1	1	1	1	415

W. Black, *Staff-Assist.-Surgeon.*

No. III.—RETURN *of* DISEASES, *arranged according to the respective Months which they occurred in, combining the Returns of Sick Officers, Men, Women, and Children, from April* 1 *to September* 30, 1852.

MONTHS.	Number of Days on which Rain fell.	Febris, Com. Contin.	Phlegmon et Absces.	Paronychia.	Ophthalmia.	Phrenitis.	Cynanche Tons.	Pneumonia.	Bronchitis.	Pleuritis.	Hepatitis.	Cystitis.	Otitis.	Rheumat. (Acute, Chron.)	Lumbago.	Odontalgia.	Rubeola.	Phthisis.	Catarrh (Acute).	Dysenteria (Acute, Chron.).	Paralysis.	Dyspepsia.	Colica.	Diarrhœa.	Vermes.	Syphilis.	Hernia Humor.	Obstipatio.	Calculus Urethra.	Vulnus Sclopet.	Vulnus.	Contusio.	Ambustio.	Ulcus.	Fractura.	Morbus Cutis.	Hæmatusia.	Amenorrhœa.	Dysmenorrhœa.	Menorrhagia.	Hysteria.	Otalgia.	Abortio.	Parulis.	Metritis.	Convulsio.	TOTAL.
April . . .	8	5	1		5		1						1	3					6	2		5		1	1				1		1				1		1	1	1	1	1						39
May	4	2	1	1	3		1		1					2	1	1			6			4	2		2	1					1	2	1	2				1			1						36
June	2	1	1		1					1	1			3	2			1	3	5		5	2	1		1						1				2		1	1			1					34
July	2	2	1		1	1			1			1		3	1		2		3	3		6		2			1	1					1			3				1							34
August . . .	1	1						3	1		1			2			32		7	5	1	4	1	1	2	1		2		1	2		1			1							1				68
Sept.	6	2	1											1			19		1	1		4			1	1										1								1	1	1	37
	23	13	5	1	10	1	2	3	3	1	2	1	1	14	4	1	53	1	26	16	1	28	5	5	6	4	1	3	1	1	4	3	3	2	1	7	1	3	2	2	2	1	1	1	1	1	248

W. BLACK, *Staff-Assist.-Surgeon.*

ART. II.—*Observations on the Meteorology of Canada.* By WILLIAM WINDER, M.D., Librarian to the Honourable the Legislative Assembly of Canada.

Amongst those who have studied the subject of meteorology and the climate of Canada, the idea has been entertained, that the mean temperature of the two provinces is nearly equal on an average of years. The accompanying tables, though not perhaps perfectly exact, have been compiled with the view of obtaining something like an approximation to the truth of the above statements. They comprise a period of thirty-four months, from 1847 to 1849 inclusive, being the only years to which the compiler had access, with reference to both sections of the country, and are deficient in the months of January 1847 and February 1849, of which no record could be found. The month of January 1847, for Lower Canada, was indeed available; but the corresponding one for Upper Canada, necessary for comparison, could not be procured. The whole of the observations are taken from a register of the weather, kept at Montreal, and from those furnished at the Royal Magnetic Observatory at Toronto, by Captain Lefroy. The fruits, plants, and trees of a country are said to form a good criterion of its climate, and this opinion would seem to be correct with respect to the temperature of Canada. As one proof of this, it may be remarked, that in June of the present year, a friend made an excursion to the Falls of Niagara, and botanizing in the woods surrounding them, found only two plants which do not grow on the mountain of Montreal, viz., the black walnut and the persimmon, *Diospyros virginiana,* (L.) *Diœcia Octandria;* natural order, *Ebenaceæ:* a native of the Southern States of the American Union. From hence he inferred, and it appears justly, that the temperature of the atmosphere in and about Montreal and the Falls, must be nearly the same; and on examining the tables above mentioned, we find the result of the average to be a difference, for the thirty-four months compared, of only 1·46°. A further examination also shews the mean temperature of Montreal is 46·4°, and that of Toronto 45·50°, whilst the means of the two added together give the medium temperature of the two provinces as 45·77°.

The eminent French philosopher, Arago, states the mean temperature of Europe to be 56·6°, and that of the centre of England is said to be 50°. It is impossible to ascertain, with any degree of precision, the portion of heat felt in any part of America, merely by measuring its distance from the equator. The maxims which are founded upon experience in the old hemisphere, will not apply to the new, where the cold maintains a manifest preponderance. Various causes contribute to render the climate of America different from that of the old continent. America advances much nearer to the pole than either Europe or Asia. Both of these have large seas to the north, which are open during part of the year, and even when covered with ice, the wind that blows over them is less intensely cold than that which passes over land in the same high latitudes; but in America the land stretches from the St Lawrence towards the pole; and spreads out immensely to the west. The wind, in passing over enormous mountains, covered with snow and ice, becomes so impregnated with cold, that it acquires a piercing keenness, so that over the whole of North America, a north-west wind and cold are synonymous terms. This difference in heat is supposed to be equal to twelve degrees, but Dr Mitchell contends that it amounts to fourteen or fifteen degrees.

It is an undoubted fact, that in the same degrees of latitude, the winters are colder and the summers warmer in North America than in Europe. This general observation is very important with respect to agriculture, commerce, and navigation. The following facts are interesting as proving the foregoing assertion.—Hudson's Bay, in the same latitude as the Baltic Sea, is even in summer encumbered with ice.

At New York, in the latitude of Madrid and Naples, the winter, accompanied with ice, lasts, on an average, 146 days; and the Delaware is frozen over five or six weeks. New York has the summer of Rome and the winter of Copenhagen; Quebec the summer of Paris and the winter of St Petersburgh. In America it must then be recollected, that the climate by no means depends altogether on the degrees of latitude, but is influenced, more or less, by the winds, the lakes, the great tracts of land in the north, the ocean, and the Gulf Stream. In the northern part of the United States, the medium temperature amounts to about 46°, and in the southern to 68° Fahrenheit, whilst the foregoing tables shew the mean temperature of the Canadas to be 45·77°.

			Winter.	Summer.
The medium	temperature of	Lake Superior is	21°	63°
do.	do.	Lake Ontario	30	72
do.	do.	New Orleans	59	83
do.	do.	Key West	70	81

In Quebec, the thermometer sinks to 30° below zero, and rises in summer to 95° above zero. In Baltimore, the thermometer rose twice, in the course of eight years, to 98°, and sank four times below zero; whilst in Montreal and Hamilton (at the head of Lake Ontario) it has been noted as high as 103° of Fahrenheit in the shade.

Humboldt reckons the mean temperature of the air, overland, nearly on a level with the sea, at the equator, at 81·5°; the mean temperature of latitude 45°, in Europe, at 56°. At the pole, judging from the observations of Captain Parry, the mean temperature cannot be taken to exceed 13° below zero.

In the immense valley of the Mississippi, to the west of the Alleghanies, the mean temperatures are nearly the same as in the corresponding latitudes on the Atlantic; but, as in Upper Canada, compared with the Lower Province, the winters are not so cold, nor the summers so hot. The mean temperature of the west coast of America appears to correspond with the mean temperatures of the western parts of Europe.

The preceding remarks apply only to the temperature of those parts of the earth that are nearly as low as the surface of the sea; but as we ascend into the atmosphere the temperature constantly diminishes, so that even in the torrid zone, at a certain elevation, we come to the region of perpetual congelation. The cause of this diminution of temperature is the expansion of the air in proportion to its elevation, which occasions an increase in its capacity for heat, and a consequent lowering of its temperature. The diminution is partly counteracted by large masses of earth which communicate heat to the air. This is probably the reason why the temperature of Mexico and Peru diminishes, according to the observations of Humboldt, only one degree of Fahrenheit for every 495 feet of elevation; while in Scotland, Dr Hutton of Edinburgh, states the diminution to amount to one degree for about 268 feet of elevation. He kept a thermometer on the top of Arthur's Seat, and another at Leith, near the level of the sea, for three years. The mean difference between the two was 3, and the height of Arthur's Seat, above the level of the sea, is very nearly 803 feet.

M. Arago has demonstrated that during the last 2000 years the temperature of the earth has not varied so much as one-fifth of a degree, as otherwise the length of the day would have altered, which is not the case.

When we dig to a certain depth below the surface of the ground, we come at last to a situation in which, if the bulb of the thermometer be put, it remains unaltered during the whole year. The heat at this depth is considered as representing the mean heat of the place at the surface of the ground. The bottom of the cavern under the Observatory at Paris, is about ninety feet below the surface of the earth; a thermometer placed in it varies only about one-fifty-fifth of a degree during the whole year, from 52°, which is the exact mean temperature of Paris.

It therefore appears, from the preceding observations, that at a certain depth below the surface of the earth, which does not seem much to exceed thirty feet, the thermometer remains unaltered during the whole year, and exhibits the mean temperature of the surface in that locality. Hence the mean temperature of a place may be determined by that of springs flowing from a certain depth (not less than 30 feet) under ground. The wells at New York vary from 32 to 40 feet in depth, and, according to Dr Nooth, the mean annual variation of their temperature is 2°, namely, from 54° to 56°; this would make the mean annual temperature of New York 55°. Dr J. Hunter states that the temperature of the wells at Brighton, in Sussex, vary from 50° to 52°, which would make the mean temperature of the air in that part of Britain, close to the sea, 51°; whilst the mineral spring at Tunbridge Wells, a short distance from Brighton, is always of the temperature of 50°, as appears from observations made in winter and summer. Thus it would seem, that at a certain depth below the surface of the earth, a thermometer indicates the mean temperature on the surface; that this depth is not much more than 30 feet; and that, probably, no great increase of temperature could be found at the depth of 60 feet. When, however, we penetrate to a greater depth below the surface, the temperature becomes higher than the mean of the place, and the elevation of the thermometer increases as the depth augments.

The vegetable kingdom in America has reigned under two great aspects, those of forests and prairies. The forests extend from the River St Lawrence to the Gulf of Mexico, over plains, declivities, and mountains. A European can form no idea of the magnitude and beauty of the American primeval forests and trees; and while in France there are said to be only thirty-seven kinds of trees that grow to the height of 30 feet, there are, in America, one hundred and thirty kinds which exceed this measurement; which, with the variety of their growth and foilage, are the admiration of every beholder.

On a review of the vegetable products of the Canadas, we find that in both Provinces they are much the same, a consequence that might be expected to follow from the similarity of climate.[1]

Of those of Upper Canada it may be remarked, that all the fruits generally found in Britain thrive remarkably well; but the plum, apple, strawberry, raspberry, and melon, attain a luxuriance of growth and perfection, as stated by a modern writer, unknown in Britain. The melon, planted in the open ground, in most years produces excellent crops. In many places vines prosper well. Peaches are indigenous south of the parallel of 43°, or at least grow rapidly from the stone, and bear fruit within a few years; although good and rich flavoured grapes and peaches are seldom met with, owing to their culture being neglected. The same observations apply to all garden produce, which will attain a degree of luxuriance unknown in Britain, with much less care and culture. In Lower Canada, the new land is covered with timber; the greater part of the trees being from 2 to 3 feet in diameter;—the larger the timber, the better the soil;—and, therefore, the choice of land is generally directed by the growth of timber on it. Where beech, maple, hickory, butternut, and chestnut grow, we find a good soil of yellow or hazel loam; where elm, white ash, white oak, butternut, and red oak grow, the soil is strong; where white pine, hemlock pine, birch, and spruce grow, the soil is sandy; cedar swamps, though often composed of good soil, are not desirable, unless easy to drain; black ash, soft maple, or plane swamps, are mostly on a clay or marl, and if well drained make lasting meadows; where there are small poplar and small white birch, the soil is poor, being light loam on white clay.

The foregoing may be taken as a descriptive list of forest trees in the Lower Canada, and the soils on which they grow. The soils most congenial for orchards are light loam or gravel. Apple trees thrive much, also, on rocky or limestone land. A great variety of apple, pear, peach, plum, cherry, grapevines, and other fruit trees, may be found in the neighbourhood of Montreal: the apples from thence are considered superior to any other. Cherries, chestnuts, walnuts, hickory, hazel, and filbert nuts, grow wild, as in Upper Canada—as do gooseberries, strawberries, raspberries, bilberries, cranberries, and black currants.

These details will, it is hoped, be of some service to those whose attention may be directed to the study of the climate of the Canadas, and their agricultural capabilities.

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[1] Remarks on the Meteorology of Canada, by my son-in-law Dr Stratton, R.N., may be found in the Edinburgh Medical and Surgical Journal for January 1847, July 1847, and January 1848.

The present rage for emigration to North America and Canada, has certainly been the means of eliciting much valuable information relative to those countries; but it has also produced much merely literary speculation, numerous ridiculous blunders, and not a few wilful misrepresentations. The dictum of Voltaire, that Canada was merely a barren rock, covered with perpetual frost and snow, has, with strangers, passed into a proverb. But the emigrant farmer may be told with truth, that although the season appears short, and the cold intense at certain periods, the winters are more pleasant and salubrious, and the summers warmer than those of Britain; the seasons more uniform, and the air more clear and dry.

The following results taken from the Government Meteorological Observations, made at Toronto for the past ten years, will serve to correct any erroneous impressions respecting the climate of Upper Canada;—

Mean temperature, taken from ten years' observation, 44·3°.
Highest temperature, 95·0°—12th July 1845.
Lowest do. 18·6°—16th January 1840.
Total number of days on which rain fell, 965.
Yearly average, 97.
Total number of days on which snow fell, 475.
Yearly average, 47.
Total number of days perfectly fair, 2213.
Yearly average, 221.
Average yearly depth of rain, 33·4 inches.
Average yearly depth of snow, 56·6 do.
Mean temperature of four summer months, 62·6°, four warmest months.
Mean temperature of four winter months, 26·6°, four coldest months.

It is to be remarked, that if a particle of snow or rain falls during the twenty-four hours, the day is respectively considered at the observatory as a rainy or snowy day.

TORONTO, CANADA, *August* 1850.

ART. III.—*Upon the Inosteatoma, a Fatty Tumour found in the Uterus.* By Dr WILLIAM BUSCH. (Muller's Archiv fur Anatomie, Physiologie, und Wissenschaftliche Medicin, 1851. Heft iv., pp. 358.)

A lady, aged fifty years, who had suffered for the space of eight years under obstinate leucorrhœa, discharged from the vagina, about eleven months previous to the date of the paper, amidst pains like those of labour, a tumour as large as the fist. This had taken place, however, without being signified to any physician. Since that time, there issued periodically from the *os uteri*, a sero-mucous fluid of a pestilential smell, and at intervals small flat masses came away.

Upon the external examination, the *fundus uteri* was found somewhat enlarged lying above the *symphysis pubis*. Internal examination shewed the vaginal portion to be quite sound; the lips a little separated from each other, so that scarcely could the tip of the finger be placed between them. Through the cavity of the vagina, the examiner felt the body of the uterus considerably distended, so that this organ filled the largest portion of the pelvic cavity. In other respects, it appeared not particularly hard, and it was free from pain on being touched. By means of the finger, the wall of the uterus could be separated from the body therein contained. The uterine sound entered through the neck of the uterus, and then encountered an impediment. From this the wall of the uterus appeared to be sound, and the distension of the organ could only be produced by a new production filling up its cavity.

Though both the smell of the fluid and the emaciation of the patient gave rise to the suspicion, that in this case a Karkinomatous degeneration was the disease, yet this inference was contradicted by the healthy condition of the *cervix uteri*, and the wall of the uterus, so far as by the exploring finger could be ascertained. It was rather to be presumed, that a non-malignant tumour had, from mortification and detachment of individual portions, produced the cadaverous odour.

Some time previously, I met with three such portions, which had been detached immediately after examination. The size of these fragments varied from that of a large pea to a bean; their shape was in general roundish, but the surface was not smooth, and presented different depressions, such as soft bodies which lie upon each other communicate; their colour was reddish-gray; their consistence of that degree that the bodies could be rubbed down between the fingers. When thrown into water, they speedily sank to the bottom.

When a transverse section of them was made with a sharp knife, the section appeared to be perfectly homogeneous. With the unaided eye, in no part was it possible to observe any trace of fibrous structure. As little was this perceptible when we broke off some of the substance, by which, for instance in medullary swellings, or when the *corpora caudata* run in the same direction, we observe the fibrous appearance almost as distinctly as the real fibrous structure in fibrous tumours. In one of these detached portions, however, we observed in two different sections an appearance of considerable interest.

As in *Karkinoma reticulare*, irregular net-like figures are disseminated in the gray ground-work, so here are carried through the tumour thick yellow cords of more regular cylindrical shape, like threads. The course of these is various. Some are more or less parallel with each other; others lie at right angles to these, and so forth; only one does not intersect another, but passes freely above or beneath it.

When a portion of the gray ground-mass is placed under the microscope, it proves this to be very opaque; but by moderately strong pressure it is possible to discover something regarding the structure. The chief part of this is a great mass of fibres, as these figures would shew any one who had seen them for the first time, without knowing the subsequent appearances. These fibres are of very variable breadths; some are double the breadth of others; they are, as it appears, cylindrical, but never have a smooth outline. Sometimes they appear slightly undulated, as may be seen in figure 2, upon attentive examination. Their course is very irregular;—sometimes straight, sometimes bent to this side or to that side, and altogether in the most different directions, so that they allow the texture to appear as if perforated. The meshes, which in this manner are formed in the intervals of these fibres, are hence not uniform and like each other, enclosed by bundles of fibres lying beside each other, but irregular throughout.

In this many-ways contorted net-work, there may be observed still other figures, and which constitute by far the smaller part of the mass. Of these one set are globules of irregular shape, mostly twice as large as the blood-corpuscles, and which, from the way in which they refract the light, prove themselves to be fat-globules,—an inference, which was afterwards found to be correct, by treating them with ether. The other set, which were more abundant in comparison with the last mentioned, consist of a granular completely amorphous detritus, upon the peculiarities of which, nothing more satisfactory can be communicated.

This whole mass, namely, the fibrous net-work, with its content, is intersected in individual spots by large fibrous bundles, which are united in the form of neat sheaves. The fibres which compose these bundles completely resemble in structure the separate and individual ones. Of similar sheaves also consist those of the above mentioned thick cords, which, with the unaided eye, were remarked to be of deep yellow colour upon the section of one of the tumours.

As the outline of these fibres was very dark, and in general the whole mass was opaque, I expected that I should be able to remedy this by means of strong pressure; but by this means the whole figure was at once changed. Where previously the slightly tortuous slender threads ran, in their places bristled short spit-like needles. These rods are throughout straight, sometimes so far that two or more lie together, giving the impression as if they were ramified. Between them lay the amorphous substance, as previously. In order to be quite certain that these bodies were composed of fibres, I compressed some of them under the microscope, and was able then to observe their origin. Very natural, accordingly, is the conjecture, that the long fibres are formed in this manner, that many of these rod-like bodies lie upon each other, and thus produce the impression of a thread; but upon the most careful examination, neither I nor those to whom I shewed these figures could observe a conjunction of several short bodies into one long one.

In order to be able better to study the nature of these enigmatical bodies, I determined to remove, where it was possible the surrounding substance, and I applied to one object-glass some drops of ether, in order previously to remove the apparent fat-globules. The fat-globules indeed disappeared, but with them also at the same time the fibres, which first became progressively pale, and at length were no longer to be distinguished. The small needle-like crystals first disappeared, then the individual fibres; the thick bundles resisted the action longest. This was the proper place for performing the chemical experiments which could be undertaken on the small specimen that I possessed. Hot ether and hot alcohol dissolved the crystals exactly as cold ether. As they were at the same time insoluble in water, it hence results that they were formed of an adipose or fat matter. A solution prepared in cold ether was enclosed in a watch-glass, and allowed to evaporate in the atmospheric air, in order to be able to observe more accurately the probable formation of crystals upon the volatilization of the ether. When the ether was completely evaporated, there remained in the glass a greasy white deposit, which under the microscope was shewn to be drop-like fat.

A portion of the tumour was afterwards boiled in water for several minutes. The fibres remained after this entirely unchanged;—a proof that this fat does not become liquid at one hundred degrees. By this character it is altogether separated from the series of the usual forms of fat; since as to Stearin, Margarin, Olein, Butyrin, the liquefying point lies more or less below one hundred degrees. From these forms of fat, the one obtained from this tumour is further distinguished by another reaction; namely, that neither warm nor cold potass effects in it any perceptible change.

A figure is given shewing the bundles of fibres which Dr Busch had boiled with pure potass for the space of three minutes. It is seen that in this the intermediate substance is dissolved, while in the fibres not the slightest change can be observed. This fat is therefore not convertible into soap.

Concentrated hydrochloric acid induced no change in the fibres; neither did acetic acid. Concentrated sulphuric acid, on the other hand, induced a transformation. One portion of the tumour treated with this acid became at first yellow, then brown, afterwards red, then of a violet colour, and eventually passed into a dark black green. These changes in colour followed each other very rapidly, so that it was requisite to perform the experiment several times after each other, in order to be able to observe accurately the succession of changes. When a portion of the substance thus altered is placed under the microscope, though the fibres are still to be observed, yet they have become considerably paler, and their outline is no longer so regular as formerly, and sometimes it is entirely interrupted.

If the dilute acid is warmed, the substance which had previously been of a clear brown colour, passes through all the shades of colour, which the tumour itself had first shewn, until, in the course of boiling, it has become entirely dark green. During this process, the observer sees the tumour, which floats in the acid, at first become gradually contracted at the edges, then divided, and at length disappear, so that the experimenter, after he has boiled the acid, no longer finds any crystals.

If we ask, for what sort of fat we must regard the fibres or crystals, after these reactions, I find among the known varieties of fat, no one which perfectly corresponds to the present. From the usual forms of fat it is excluded, as has been above said, by its high liquefying point, and its unsaponifiable quality. By these two properties, it may stand next to Cholestearin; but from this it is again separated by the shape, and furthermore, by this circumstance, that it is not crystallised from the solution, but is precipitated in an amorphous form. Meanwhile it may bear the name of INOSTEARIN.

Similar crystalline formations, nevertheless, have not been altogether unnoticed previously. The first person who has described something of this kind is John Müller. In the year 1836, of his Archives of Anatomy, page 219, he speaks, in noticing the structure of a *collonema* from the collection, of Pockels,—of similar crystalline, club-shaped needles "which are not soluble in acids and alkalies. By means of the latter, which dissolved the uncrystallised portion of the tumour, the needles may be separated. The crystals were destroyed by boiling portions of the tumour in water; but they remain unchanged at the temperature of the human body. In hot spirit of wine they are insoluble; in boiling ether soluble."

That these elements are analogous to ours, appears, further, when the observer compares, with the figure given by myself, the figure given by Müller, which was afterwards published in the Treatise on the Minute Structure and the Forms of Morbid Tumours, table third, figure 13. These are altogether such needle-shaped clubs, as in our figure, which represents the bursting crystals, are accidentally present, only very small, lying onefold; and the mass of the uncrystallised matter is more considerable than in our tumour. This last circumstance may also cause, that the tumours from the collection of Pockels are so much softer than ours; since they looked like jelly, and trembled on being touched. This circumstance permits us to think, by chemical examination of the substance, that of the softer albuminous matter much more was present than in our case. It may also be possible, that this same substance, which in our case shewed itself in the sheaf-like fibrous bundles, or the individual long-stretched fibres, there appeared only in the short spit-shaped crystals, in which the fibres of our tumour first at bursting were divided. There are still, however, great chemical differences, which oblige us to separate these two forms of fat, although morphologically they are so similar to each other. Both possess the common qualities, that they are soon soluble in hot ether, and that they are not convertible into soap with alkalies. But while the crystals of the tumour examined by me are soluble in boiling alcohol, and are destroyed by hot sulphuric acid, in neither of these was this the case in the tumour described by Müller. Again, while in the tumour described by me, the liquefying point was above one hundred degrees, the matter of the tumour of Müller melted away in a temperature between the heat of the human body and that of boiling water.

Next to this case there is a short notice upon these crystals by Virchow in the first part of the Archives of Pathological Anatomy, page 334. Virchow must have often met with these formations in places in which putrefying animal substance has lain for a long time within the body, as in carious destructions of the internal ear, and in exudations into the parenchyma of the lung. I would, from his short description, regard our crystals unconditionally as the same, did he not mention that they were dissolved in hot ether, and that then after cooling, they were precipitated in drops like a white acid reacting fat of a disagreeable odour; whereas our crystals remained dissolved in cold ether.

With these passages there is another which it is difficult to reconcile. In the third volume of the Transactions of the Midwifery Society of Berlin, page 202, he speaks of the same crystals, that he succeeded in dissolving the same by treating them with cold ether. Probably he had, on the second occasion, before him a species of fat, which, though morphologically like the first, was chemically different. As to the figure which Virchow gives at figure 9, in relation to this, they might fully resemble the fibres of the tumour described by me, providing they had a more lengthened course; because then they might lie tailed or caudate, as fibres of cellular tissue; but in portions so short as Virchow represents them, I have never been able to observe the undulating arched direction, but constantly only the straight spit-shaped crystals.

On the action of other reagents, acids, alcohol, he gives no information, nor states the degree of heat at which the crystals melted; hence I know not whether the crystals seen by Virchow are analogous to those seen by Müller, or those obtained by myself.

To the present time we are acquainted with two species of fat chemically different from one another, which present themselves to the eye in this remarkable form, and both are hitherto very incompletely known. The quantity of this new species of fat which was at my command was too small, to enable me to perform with it a satisfactory chemical and elementary analysis. As soon as opportunity is given me, I shall make known the results.

As to the origin of these forms of fat, already has it been mentioned by Müller, that he had very frequently met with several of these crystals in tumours, which had been preserved in spirit of wine; and in like manner has Virchow seen them in the COLLOID tumour of the ovary, though in smaller number in proportion to the other substances; as he has also observed them particularly in all sorts of putrefying masses, for instance in gangrene of the lungs, caries of the petrous portion of the temporal bone, in the follicles of the tonsils, in the deposits which are formed in consequence of pessaries being allowed to remain long in the vagina. Sometimes, however, there also arise tumours, in which these crystals are characteristic, and of which they constitute the principal part. Of these hitherto, three instances are recorded.

The two first, from the collection of Pockels, one from the brain, the other from the female mamma, John Müller has described, under the name of *Collonema,* on account of its peculiar soft, tremulous condition. Whether in this sort of tumour the crystals were contained from the first in the spit-like shape, or whether they first through the separation of the texture, were reduced to that condition, that they shewed in the beginning the fibrous sheaves seen in the tumour described by me, cannot be determined.

The third case is the one from the uterus described by me. In this I may finally be permitted to direct attention to the more accurate examination of similar cases, since these tumours, if they have not, in consequence of the great mass of salivin or albuminoid matter, as in the cases given by Müller, the jelly-like appearance, yet perfectly resemble masses of distintegrating muscular flesh; and hence, probably, they might often pass under other names, if the microscope did not furnish the explanation. It would be very desirable, further, to have one single opportunity of examining, in the recent state, one large tumour consisting of this substance; since this matter, which constitutes its principal portion, in this form at least, is hitherto unknown in the sound state of the organism, and in its constitution, presents extraordinary characters.

ART. IV.—*Nosographical Observations and Cases illustrating the Course, Nature, and Termination of the Disease of the Jaw-Bones incident to Lucifer-Match Makers.*

Die Krankheiten der Arbeiter in der Phosphorzundholz Fabriken, Insbesondere das Leider Kieferknocken durch Phosphordämpfe, &c. Bearbeitet von Dr FREIHERRN ERNEST von BIBRA and Dr LORENZ GEIST. Erlangen, 1847, 8vo.

The Diseases of the Workers in the Lucifer-Match Manufactories, especially the Disease of the Jaw-Bones, from Vapours of Phosphorus, in a Chemico-Physiological, Medico-Chirurgical, and Medical Police Relation. By Dr FREI-

HERN ERNEST von BIBRA and Dr LORENZ GEIST. With Nine Copperplate Drawings. Erlangen, 1847, 8vo.

I.—Semeiographical Phenomena and Course of the Disease.

Whether the upper or the lower jaw is attacked, the earliest symptoms common to all the cases is, according to the testimony of all observers, pain in the teeth; toothach. This begins after a sojourn in the manufactory varying from six months to twelve years; in one case given by Lorinser it made its appearance after only five weeks. The pain attacks apparently, one or more teeth; or it spreads, in some cases, like pain proceeding from a rheumatic cause, over one or both halves of the jaw. Only in very rare, and at the same time violent cases, is it not limited to one side, but extends also to the other half of the jaw-bone. This pain is described as gnawing, beating, alternating with violent shootings; sometimes intermitting, sometimes continuous. In certain cases this pain commences at once in the beginning of working, continues two weeks or so, then leaves the patient for months and years, returns after this interval, even several times, until at length the deep-seated disease breaks forth. The general feelings of the patient often continue undisturbed during the time of working; and just after a space of from fourteen days to six months, when the patient has discontinued from working, the disorder breaks out. With the exception of only a few cases, in which the observer directed in special observation to the carious tooth, or the tooth had been extracted before the commencement of medical treatment, as not uncommonly happens, there is a spoiled tooth, in which the pain commences, and from which it appears to extend.

Along with this pain in the teeth is associated, according to the observation of Neumann, in certain cases, itching of the gums, and the patients spit blood, which, according to their statements, must proceed from the palate. This observation Dr Geist has not made; but he is of opinion that this blood is drawn by sucking from the gums, because the patients feel instinctively that it contributes to the alleviation of the pain.

After the toothach has continued in the manner stated for weeks, or even months, during which time the girls often enough continue to work in the most incautious manner, it is no longer confined to the teeth, but is diffused over the whole upper and lower half of the jaw in which the spoiled tooth is seated, and it radiates, in violent cases even, over the entire half of the face and neck, corresponding to the seat of the disease. In some cases the lymphatic glands of the neck are swelled, and become painful; the gum which surrounds the diseased tooth becomes red, swollen, and the cheek may in like manner be swelled, as it at the beginning presented a hard tense swelling. In many instances, the gum is swollen, and forms a soft elastic tumour, which receives the impression of the finger. This is particularly the case when the upper jaw is the seat of the disease; and in this not unfrequently, especially in slight cases, the soft palate also partakes, and it evinces a more or less deep red, elastic, puffy swelling, which, in the ordinary cases, remains confined to the half of the palate directed to the diseased side of the jaw-bone; but in more severe cases, extends also to the other half.

In other cases, there is formed, amidst tense throbbing pains, at the spot of the diseased tooth, a circumscribed phlegmon of the gum; this proceeds to abscess, which bursts, or being opened by the surgeon, discharges at first good matter, afterwards grayish fetid matter, and is converted into an open sore, which, from the progressive retraction of its edges, goes on gradually enlarging. When this is not the case, the gum, which hitherto had formed a soft elastic swelling, is drawn back at its edge, or there are formed in it, both on the side directed to the cavity of the mouth, and on that turned to the cheek, small abscesses, which burst and discharge purulent matter. Further, the purulent matter is felt, particularly when the upper jaw is attacked, to be as if sandy, when rubbed between the fingers, by the admixture of very small particles of bone. At this stage of the disorder, the teeth of the affected side, equally whether they are sound or carious, begin to be loose, and either drop out spontaneously, or are taken away by the finger. The extent in which the teeth in this manner are lost, usually denotes also the extent to which the disease has attacked the jaw-bone.

In the gum there are formed several abscesses, which, after bursting, discharge fetid purulent matter; the gum then gradually loses its bright colour, becomes livid and is undermined by more or fewer fistulous passages. From these the purulent matter oozes as from a sieve, fills the empty *alveoli*, and the probe penetrates through the different openings to the bone, which, when the upper jaw is affected, is felt altogether rough and carious.

On the cheek, which hitherto had formed a hard tense swelling, with more or less of erysipelatous redness, the erysipelatous-like inflammation proceeds in individual spots, more or less distant from the diseased bone, to the formation of circumscribed phlegmons; abscesses are formed, which bursting discharge fetid purulent matter, and through which the probe advances in a direction straight or oblique to the bone. The gum has in the meanwhile become more considerably retracted, or it is macerated in the first bone secreted fluid, and its texture is completely dissolved; it floats with the remains of the periosteum in the purulent matter; and the alveolar processes stripped of their soft coverings lie exposed to view, and appear to project into the cavity of the mouth. When it is the upper jaw, these exposed processes present a dirty gray or gray-black, irregular and carious-looking appearance. When the disease is in the lower jaw, this denuded portion presents partly its normal colour, in parts, a gray, whitish, reddish, generally a variously coloured hue, and its surface is in some parts smooth, in others rough. At this stage of the disease the mucous membrane of the cheeks, their muscular layer, the organs of deglutition and the parotid gland may be sympathetically affected, and of this the consequences are gangrenous destruction, difficult deglutition and salivation.

The patients at the commencement of the disease are attacked by slight febrile symptoms, lose appetite, suffer from increased thirst, and irregularity in the intestinal excretion, and where the most prevalent is constipation. Not unfrequently gastric symptoms are added. The tongue is loaded; the taste mucous and bitter; weight at the epigastric region, and pain in the frontal region are felt. When the patients are of strong constitution, or not scrofulus, when the local disease is of greater or more limited extent; while the operation of the phosphorous vapours is more or less intense; fever symptoms proceed either during the whole chronic course of the malady, as ethostic reaction, or they entirely disappear, or they are aggravated in the opposite case, when the disease runs an acute course, to synochal reaction, which at length, on following the unfavourable direction, which the local disease takes, or under the approach of general dangerous circumstances, especially the softening of tubercles deposited in the lungs, terminates in consumption.

According as the upper jaw or the lower jaw is the seat of the disease, considerable differences take place in the further course of the disease. These differences require that it be considered in the following manner.

(A.) COURSE OF THE DISEASE IN THE UPPER JAW.

In the upper jaw the disorder assumes, in the majority of cases, a chronic course, and the symptoms are milder, though among these there are not wanting instances which induce frightful destruction in the bones of the face or terminate fatally.

When in slight cases the gum, which has continued for months swelled, as if puffed up, and reddened, is either strongly retracted to the edges of the teeth, or has formed abscesses, from the bursting of which the retraction of the gum has followed; if the teeth have become loose or have dropped out, and there takes place a rather scanty but slightly gray and fetid suppuration; the observer beholds the upper jaw-bone, to an extent more or less considerable, stripped of its coverings, and, as it were, projecting into the cavity of the mouth. Often it is merely the alveolar arch which thus projects; but sometimes the entire body of the bone is exposed. The portion which lies thus patent to view is always of a dirty black-gray colour; its outline of compact bone (*lamina vitrea*), is destroyed; and the cancellated tissue of the bony substance of the alveolar arch is exposed to view. This shews the bone to be rough, angular, sharp-edged, full of inequalities, as if it were carious. It is completely permeated by the sanious matter secreted; and along with this are constantly detached small particles of bone, which communicate to the purulent matter a sand-like condition.

At the commencement this exposed portion of bone remains firm; but after some months it becomes gradually loose; and if the surgeon seizes it with a pair of strong forceps or nippers, he is satisfied that it is moveable, and always to greater extent as it lies exposed, so that uniformly the limiting boundaries around the diseased portion are covered by soft parts. The destruction of the anterior wall of the *alveoli*, whether it is entire or only partial, always gives rise, while the intermediate walls remain uninjured, to many sharp corners in the diseased bone, which irritate the tongue and cheeks, and give occasion to sympathetic inflammations of these organs.

In the subsequent course of the disease the bone always becomes more loose and moveable; large portions are detached from it, or remain ready to be removed by the forceps; the portion of bone lying exposed is always diminishing in size, and at length it either comes away of its own accord, or it is with little trouble removed by chirurgical means. When this has taken place, healthy granulations springing from the body of the bone, fill up the cavity formed by the loss of substance in the bone, and as this is united with the remains of the gum, cicatrization and healing follow, leaving, however, behind, a depression in the alveolar arch more or less considerable.

CASE FIRST. (Case 4th of Von Bibra and Geist.)—Kunigunda Sellmaier, twenty-six years of age, applied to Dr Geist on the 8th September 1845, and stated that she had worked without intermission from 1838 in a lucifer-match manufactory, without during that time having been unwell. She had worked in the place in which the process of dipping and drying the matches is performed, and she had never been occupied with numbering or packing the matches. Her duty had in another apartment consisted in placing the separate matches in the match frames. About the end of the month of August 1845, she was for the first time, amidst feelings of general health entirely undisturbed, attacked by pains in the right upper jaw, with swelling on the cheek, which she regarded as toothach, because at an earlier period, a carious tooth and its crown had crumbled away. But as at this latter period the gum was swollen, and she was afraid that she might suffer at length the known disease, she was desirous in good season to apply for medical assistance.

The girl was of middle stature, well-formed, slender, of brunette colour, healthy complexion, regular as to menstruation, free from marks of dyscrasia; the appetite was good; the functions of the thoracic and abdominal organs were undisturbed; the state of strength was favourable; no fever was present. Beyond the symptoms now stated she had no complaint.

Upon examining the cavity of the mouth, I found the gum on the right half of the upper jaw, from the first to the last molar tooth, swelled, and this swelling extended in breadth to the middle line of the gum, was resisting, was hot and of a deep red colour, painful upon pressure, and at the same time there issued thick phlegmonous purulent matter in drops at the spots of the carious tooth. This was the second molar tooth, and as its crown was crumbling away, there was observed here a deepening of the gum, at the bottom of which the carious tooth was evident. The other teeth were sound. The cheek was a little swelled, of erysipelatous redness, and of increased heat.

Two leeches were applied to the gum; an aromatic wash was ordered; and alternately a dose of Glauber's salt.

This was followed by diminution of the swelling of the gum, abatement of pain; and the last symptom scarcely again came under consideration. The patient was not hindered one moment from working in other employment, and felt throughout no after operation upon the organism, though not less the local disease pursued its peculiar course. The swelling was never completely dispersed, but became periodically larger. The roots of the carious tooth dropped out, and the contiguous sound teeth became loose.

The disease persisted without remarkable change, through the months of October and November, until in the course of the month of December the following changes took place.

In the place of the second molar tooth that had dropped out, the gum began to be drawn back, and shewed at the edge of the retroflected portion, a very red inflamed border from half a line to one line in breadth. This was the absorbed part of the gum, a process which destroyed the gum in the circumference of the part of the alveolar process which was attacked. Between the edges of the absorbed gum still appeared a dirty yellow moveable piece of bone of the alveolar process, from which issued an extremely loathsome smell. Quite the same was the case with the penultimate molar tooth, where, in like manner, the gum was absorbed, and a small portion of loose bone shewed itself. Simultaneously the two incisor teeth of the right side, the canine tooth, the first, third, and fourth molar teeth were loose and near dropping out, and hereby indicated the probable extent of the disease.

In the course of the month of January 1846, the gum had become still more retroflected; and in the place of the second molar tooth in the bone there was formed a deep hole, because here the interior wall of the *alveolus* had been absorbed, and the alveolar process appeared to be divided into two halves. Through this hole the probe went into the antrum Highmorianum. At the same time the whole alveolar process, from the second incisor tooth to the penultimate molar tooth, was loose, and its separation was to be expected. A grayish fetid suppuration continued in moderate amount; the denuded bones had lost their yellow colour, and were of a dark gray; the external lamellæ of bone were destroyed; the anterior wall of the *alveoli* was in part eaten through; and the first, third, and fourth molar teeth had dropped out.

During the last month, the course of the disease was void of fever; the patient's general health was good, with the exception that once in the beginning of January she had laboured for eight days under slight rheumatism of the right shoulder. The treatment was accordingly of the expectant character; and excepting the use of a mundifying lotion for the mouth, nothing further was prescribed, and required to be prescribed.

The offensive smell connected with the disease, on account of which the patient required to cease from work, obliged her on the 27th of January 1846, to enter the hospital. In the beginning of February the loose piece of alveolar process was extracted, and on the 14th the patient was discharged.

On the 23d of February she was again seen, and the following was her state.

The alveolar process from the second incisor tooth to the last molar tooth inclusive, was away. The first incisor tooth was still loose; but according to the statement of the patient, it had become in some degree firmer, and appeared to be about to be retained. The last molar tooth stood firm in its socket. Immediately before it was a small portion of the bone still uncovered, and on both sides of this uncovered fragment of bone were seen arising granulations which tended to cover it. The posterior part of the gum, which was not destroyed, had, in the entire length of the removed alveolar process, from behind, forwards, and outwards, been drawn upwards, and filled with the granulations proceeding from the body of the upper jaw, the deep cavity formed by the removal of the alveolar process.

The general condition of the patient left nothing to be desired, and she might be considered as completely cured.

The detached portion of alveolar process, which was not entirely preserved, forms a pyramidal piece of bone, the apex of which is turned upwards, and the base below. It embraces the whole thickness of the alveolar processes, and contains in its basis the sockets, or alveoli of the first, second, and third molar tooth, and the canine tooth. The canine tooth, and the first molar tooth, which in the figure are represented in their sockets had dropped out in the course of the disease, and are represented only to render the view of the preparation more clear. Both teeth are perfectly sound; present nowhere any trace of caries, but the tips of their roots are of a dark gray colour and transparent. The detached piece of bone is one inch two lines broad, one inch two lines high, and the same in thickness. Of the two compact plates of bone which enclose without and within the spongy texture of the alveolar arch, the anterior is in the greatest part destroyed and absorbed; the posterior is in part preserved. Throughout, the cancellated bony tissue of the alveolar arch is denuded, and lies exposed as during the course of the disease. The colour of this portion is partly gray, partly brown, and which proceeded only from the sanious matter by which the bone was so long surrounded, and which necessarily diffused itself everywhere through the cancellated texture, after the denuded compact bone was destroyed. The anterior and posterior walls of the alveolar arch are in like manner partly perforated, partly absorbed, the periosteum everywhere destroyed, while the alveolar arch shews a large amount of bloodvessels, which gives the appearance of having been eaten with caries.

This patient was shewn at the twenty-third meeting of German Natural Philosophers and Physicians, held at Nürnberg. The preparation is in the possession of the Chirurgical Division of the General Hospital.

CASE SECOND. (5th of Von Bibra and Geist.)—Barbara Kreutzer, thirty-two years of age, of middle size, slender, of fair complexion, without considerable children's diseases; fifteen years without difficulty in menstruation; free from marks of dyscrasia, never unwell, and never suffering from pectoral disorder; had entered eight years previously into a lucifer-match manufactory, and was employed for three years in the duty of fixing the matches. During this time she was never unwell; but she sometimes suffered from toothach, especially once very severely in the winter of 1840. As, however, she had several carious teeth, she paid no further attention to this pain, and the symptoms became alleviated, when she sucked the gum so as to draw blood. In the year 1841 she left the manufactory, but returned again to it in May 1844. For ten weeks she was employed in fixing the matches, but after this time she came to the numbering and packing them; and at this she continued till the outbreaking of the disease about Christmas 1845. At this time the third molar tooth in the left upper jaw began to be painful; but the pain, after fourteen days, abated; then it returned in the middle of January, and did not again leave the patient. She continued, meanwhile, working until she was found in the researches undertaken by the Royal Public Physician by public orders, in the general manufactories, and was directed to cease from working. This happened in the beginning of February. But she did not apply to Dr Geist till April.

On examination, the cheek was found swelled, of a slight erysipelatous redness, hard. In the right upper-jaw, the canine tooth was wanting; in the left, the third, fourth, and fifth molar teeth were carious, and in the left lower jaw the fourth molar tooth; the other teeth were sound. The left upper jaw was the seat of a violent boring, gnawing pain, which radiated over the whole upper jaw and the left cheek, and even extended into the left eye; the conjunctiva of which was reddened. The patient had the sensation as if the tooth were lengthened, and the pain was aggravated to a violent degree when she attempted to close the lower jaw. The gum was very much reddened, swelled, firm, resisting, and swelling extended over the left half of the gum.

In the month of March, in the site of the third molar tooth, there was formed, amidst great pain, an abscess in the gum, which burst, and discharged grayish fetid purulent matter, mixed with blood.

The general condition of the patient was not disordered. She was free from fever; the appetite was good, digestion regular; she had no cough; the general strength was good.

Eight leeches were applied to the cheek; the gums were scarified; friction with mercurial ointment was prescribed; the use of a mundifying lotion to the mouth, and laxative medicine.

Essential abatement of pain and swelling of the gum followed; but the progress of the local morbid process was uninterrupted.

Through the course of the month of May, the edges of the abscess in the gums, and also that at the dental arch and the cheek, were progressively drawn back and the bone was exposed. It was already observed that the external lamina of bone of the alveolar arch, was at the same time absorbed in the same rate at which the gum was retroflected, because the exposed bone was rough, irregular, and shewed many depressions and excavations, such as are peculiar to the cancellated tissue of the alveolar arch. The exposed bone was of a grayish colour; its cavities were filled with purulent matter and mucus; and from it issued a very fetid smell.

Without the general health of the patient being made to sympathise in the slightest degree, or the patient being once prevented from working, the disease persisted during the months of June, July, August, September, October and November. The gum had in this time been retracted in the circumference of the third, fourth, and fifth molar teeth to the body of the upper jaw-bone, so that the alveolar arch lay exposed to the same extent. The fourth and fifth molar teeth had dropped out; the anterior wall of their *alveoli* was partly perforated by caries, partly absorbed. The exposed piece of bone was of a blackish gray colour, rough, angular, sharp-edged, and very small fragments of bone of the size of sand-grains were continually separated with the purulent matter. The suppuration was otherwise very scanty, from the mixture of saliva and thin mucus; the piece of bone lying exposed was always surrounded with this fluid, which necessarily oozed through the whole texture, and gave its surface a dull glistening aspect. When the forceps were applied, the bone was found moveable, but not yet in that degree that it could be taken away without great surgical force. In the undisturbed state of the general health, there was no indication to remove the sequestrum immediately; and there was reason to wait until it might become more loose.

In the course of the month of November, the third molar tooth came away; and the second one, though sound, was loose, but still held firmly by the gum. In the month of December it was at length possible easily to remove the sequestrum. The second molar tooth, however, though very moveable, was still remaining, being held firmly by the gum. Eight days afterwards, this also was removed.

Healthy granulations quickly filled the space which was left empty by the removal of the sequestrum; the rest of the gum was united with it; and perfect cicatrization and healing took place in the course of fourteen days, without further assistance from art.

The detached portion of alveolar arch extends from the second to the fifth molar tooth. It is of grayish-black colour, with a very fetid smell, and so carious that the *alveoli* can scarcely any longer be distinguished. The external and internal compact plates of bone are entirely absorbed, the porous cancellated texture, in many places eaten through and attenuated, lies exposed. Of new formation (*osteophytum*), no more trace is to be found than in first case.

The second molar tooth shews the tip of its roots of grayish colour, bent in a hook-like fashion, a phenomenon which the author has, in several roots of teeth, seen in morbid conditions of the lower jaw. As far as the root of the tooth presents this abnormal colouring, it is, when held towards the light, transparent and clearer than the other sound portions of the tooth. The perforating canals for the bloodvessels are seen in the form of a darker streak.

The preparation is in the possession of Dr Geist.

CASE THIRD. (6th of Von Bibra and Geist.)—Barbara Harrer, nineteen years of age, a girl in bloom of health, fair, well-formed, working for two years and a half in a lucifer-match manufactory, and employed without interruption in the numbering of the matches. During the whole course of working she remained well, and suffered only at times from pains in the right canine tooth in the upper jaw, which was carious. Suddenly, in the month of June 1842, as she was one Sunday afternoon returning from church, she was attacked by pain so violent in the tooth mentioned, and in the whole upper jaw, that she thought she should scarcely be able to reach home. The cheeks at once swelled violently, and she had a fit of smart cold shivering. On the third day, nevertheless, after these symptoms, she was again in a condition to resume work. The pain, though more moderate, did not altogether cease; it even increased; and the patient resolved, by the advice of the lady who possessed the manufactory, to allow this painful tooth to be extracted. This took place at the end of June. Meanwhile the desired result failed to take place; the painful feelings continued; and what caused the patient most anxiety, the hole left by the removal of the tooth did not close, but bled continuously for the space of almost fourteen days. Amidst the increase of the symptoms, she at length left the manufactory in the month of July.

She requested the nearest assistance from a surgeon, who, in reference to the advancing disease, extracted three sound incisor teeth. The same, in the further progress of the disease, was also the fate of three other teeth, which a military surgeon extracted. After the patient had lost seven teeth by extraction, four others followed afterwards the same course, with the exfoliation of the alveolar arch.

The phenomena of the disease consisted in swelling of the gums of the soft palate, in which, however, the patient had the sensation as if it were covered by fur, and complete insensibility to pain. An abscess was gradually formed, in the gum, which was progressively retracted; and in proportion as this retraction took place, the alveolar arch became exposed. From time to time the face swelled with great pain, and the patient was obliged to keep in bed.

The treatment consisted, besides the extraction of teeth, in order to abate the supposed odontalgia, in the employment of a lotion for the mouth. This continued to the end of October. When at length a physician was consulted, he, considering the seriousness of the disorder, recommended the removal of the diseased alveolar arch by operative means; and to this the patient did not give her consent. The patient continued to use different remedies which were recommended. Mixture of cochlearia was used for the retraction of the gums and the exposed bone, though these symptoms take place in the natural course of the disease. Kreosote, among other means, was longest employed, and was continued to the exfoliation of the alveolar arch. At length, on Easter Saturday 1843, the diseased portion of bone had become so loose, that the patient removed it by her fingers.

Cicatrization followed as in the first two cases, very speedily, as the remainder of the gum closed over the breach which the exfoliated piece of bone had left. To the patient, meanwhile, great deformity was caused. In consequence of the loss of the greater part of the alveolar arch, the upper lip is sunk inward, and gives the patient an aged appearance; speech is also inarticulate, and mastication is rendered difficult. The patient, indeed, endeavours to help her deficiencies by placing folds of linen below the upper lip. But this contrivance is quite inadequate, from the circumstance that with it is necessarily connected great uncleanliness. It were greatly to be wished that, at the public cost, a suitable apparatus might be provided to supply the deficiency caused by the loss of the alveolar arch.

The separated portion of alveolar arch embraces the *alveoli* or sockets from the second molar tooth on the right side to the fourth molar tooth on the left side, in all ten alveoli. It is bounded above by the lower nasal fissure, and on the right side there is still found a pyramid-shaped large piece of the nasal process. Behind, the anterior third of the palatine process, with the palatine canal, is contained in it. The *alveoli* are carious, in many points, especially that of the right incisor tooth, and the corresponding canine tooth, which almost together, present only one large cavity. The compact plate of bone is for the greatest part well preserved, partly carious; the bony texture of the substance of the alveolar arch is also partially carious. In general the bone is very well preserved.

This case is the first that was observed in Nürnberg. The preparation is in the possession of Dr Geist.

These three cases illustrate the symptoms and the course of the disease in the upper jaw, in a mild form. The disease is in these cases confined to the alveolar portion of the jaw-bone; and though it attacks this part to great extent, yet in strong constitutions it gives rise to no general disorder in the organism, at least in further progress, although at the outset of the disease febrile symptoms appear for the space of eight or ten days. In these cases no abscess breaks through the skin. The disease in all the cases was chronic, and got well, with loss of a part of the alveolar arch. While with small loss of substance no deformity of the face and impediment to speech are left, in greater losses of substance, the deformity and impediment of speech are moderate, and capable of being remedied by means of art. In feeble individuals, however, and in those affected by tuberculation of the lungs, even this degree of the disease may be dangerous to life. These cases, nevertheless, are more rare. We count among those observed at Nürnberg only three cases; among those at Vienna only one, which in 1847 was under treatment (Case 21). The other cases, again, in which the upper jaw was the seat of the disorder, must be numbered among the serious instances. This also is true of the cases observed in Berlin and Strasburg.

When the disease attacks the upper jaw-bone in a larger extent, or spreads to the contiguous bones of the face and skull, so that the zygomatic process of the palate bone, the muscles of the nose, with the orbits, are involved in the morbid process, the soft parts also partake in this enlarged field of action. There are formed fistulous passages opening externally, which pass through the cheeks; the soft palate, the velum, the tonsils are swelled and are progressively destroyed; large portions of bone lie denuded; the articles of food are brought back through the nostrils; a very offensively-smelling fluid is secreted; fragments of bone, varying in size, are separated with the purulent matter, or are removed by art; even the larger part of the bones of the face may be destroyed. Fever ensues, and if the separation of the affected portions of bone do not take place, the patients die with symptoms of general tabes,[1] or indications of tubercular phthisis.

Cases of this kind have been recorded by Lorinser, Strohl, and Sedillot; and it is only to be regretted, that in many instances, which did not terminate mortally, either the course of the disease was not further observed, or the mode of recovery was not ascertained. The ravages by this disease to the extent now noticed, have been only twice observed in Nürnberg, namely, in Cases 4 and 5 of the table. But Dr Geist was unable to obtain upon them further information.

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[1] The author says, "symptoms of consumption," "consumptions-erscheinungen." But as this always in English means tubercular phthisis, it is evident that he applies the term consumption to some other wasting process, probably what is called *tabes*, or to hectic fever.

One of the most important of these cases is the following:—

Case Fourth. (7th of Von Bibra and Geist.)—Karoline Velt, twenty-four years of age; large, strong, of lymphatic constitution, without symptoms of scrofula, irregular in menstruation, always healthy, never affected by syphilis, applied to Dr Strohl at Strasburg on the 25th of June 1845. She had been working for the space of five years in a chemical match manufactory, and had been engaged without intermission in dipping the matches in the liquefied phosphorus. So long as she was working she felt no bad consequences. She left the manufactory and entered another service. Three months afterwards, she felt in the whole of the right half of the upper jaw, violent pains, which were speedily followed by swelling and an abscess in the gums. The abscess was opened, and eight teeth, which were quite carious, were taken away. The symptoms upon this abated, but speedily returned in an aggravated degree, and attacked the cheek and the right side of the neck, which was painful and swelled. An abscess was then speedily formed in the upper side of the neck; the swelling was tedious in dispersing, and it was only a little abated after the lapse of one month. According to the statement of the patient the purulent matter at first smelled strongly of phosphorus.

Upon examination there were found slight swelling of the posterior right half of the cheek; at the upper part of the neck a prominent elongated cicatrix; a little further up towards the angle of the lower jaw a fistulous opening, from which proceeded yellowish purulent matter, and through which the probe reached the lower jaw-bone and struck upon a rough spot. The patient stated that never had any fragment of bone been exfoliated at the place. In the interior of the mouth the right upper jaw in its posterior half was entirely stripped of its soft coverings; its surface was of a gray colour, rough, sharp-cornered, not softened, moveable, and something crepitating. Anteriorly the gum was softened, and it was found that here the bony substance was entirely lost, yet without the bones having been stripped. The soft palate was on this side somewhat prominent, probably only in consequence of the swelling of the soft parts. In the right lower jaw almost all the teeth were gone. About the middle of the lower jaw was observed one piece of bone, the size of a vetch, stripped of soft parts, yet not moveable and not rough. The gums were softened as if soaked in a grayish fetid suppuration.

All the other functions were normal, except that she had cough for three weeks.

Several remedies had been employed, among others cod-liver oil, which the patient, however, was unable long to take. Other remedies were, olive oil with iodine internally, kreosote in water as an injection into the fistula, and a chlorine water gargle.

On the 13th of July the sequestrum was loose; the patient was able to take it away with her finger; it was black, fetid and rough. The wound presented a very good aspect. Fluid, and often also solid articles of food, which the patient took into the mouth, were in part forced back again through the nostrils, without the soft palate or the velum having been affected. This communication proceeded probably from the loss of substance in the bones. A hook-shaped bent probe entered into a very deep cavity on the side of the nostrils, and struck here against a rough surface of bone. The denuded portion of the lower jaw was smaller; the gum less swelled, and more firm. The fistula under the angle of the lower jaw presented an improved appearance; the suppuration was more moderate, and of better condition. Great improvement in general had taken place.

Three spoonfuls of iodized oil were ordered. The same treatment was continued.

On the 20th of July the improvement was advancing. The tonsils only were somewhat red and swelled.

The gargle and the injection were discontinued.

On the 30th of July the inflammation of the tonsils was gone. The loss of substance in the upper jaw disappeared amidst advancing cicatrization. The fistula ceased to extend.

Injections and gargle were resumed.

On the 26th of August, improvement was continuing. The fistula was less deep, and the probe no longer encountered any exposed bone. The suppuration was something better and more healthy. Fluids were still brought back through the nostrils. The exposed portion of bone in the lower jaw had not become larger; the bone itself was smooth and firm. The gum was no longer swelled.

Four spoonfuls of iodized oil were ordered; the gargle was directed to be left off.

Sedillot records two cases, one of which is very remarkable.

CASE FIFTH. (8th of Von Bibra and Geist.)—A young woman, aged twenty years, had been working for the space of four years in a phosphorous-match manufactory. Two years previously to the date of application, she suffered, after the exgum, abatement of pain; and the last symptom scarcely again came under consideration. The patient was not hindered one moment from working in other employment, and felt throughout no after operation upon the organism, though not less the local disease pursued its peculiar course. The swelling was never completely dispersed, but became periodically larger. The roots of the carious tooth dropped out, and the contiguous sound teeth became loose.

The disease persisted without remarkable change, through the months of October and November, until in the course of the month of December the following changes took place.

In the place of the second molar tooth that had dropped out, the gum began to be drawn back, and shewed at the edge of the retroflected portion, a very red inflamed border from half a line to one line in breadth. This was the absorbed part of the gum, a process which destroyed the gum in the circumference of the part of the alveolar process which was attacked. Between the edges of the absorbed gum still appeared a dirty yellow moveable piece of bone of the alveolar process, from which issued an extremely loathsome smell. Quite the same was the case with the penultimate molar tooth, where, in like manner, the gum was absorbed, and a small portion of loose bone shewed itself. Simultaneously the two incisor teeth of the right side, the canine tooth, the first, third, and fourth molar teeth were loose and near dropping out, and hereby indicated the probable extent of the disease.

In the course of the month of January 1846, the gum had become still more retroflected; and in the place of the second molar tooth in the bone there was formed a deep hole, because here the interior wall of the *alveolus* had been absorbed, and the alveolar process appeared to be divided into two halves. Through this hole the probe went into the antrum Highmorianum. At the same time the whole alveolar process, from the second incisor tooth to the penultimate molar tooth, was loose, and its separation was to be expected. A grayish fetid suppuration continued in moderate amount; the denuded bones had lost their yellow colour, and were of a dark gray; the external lamellæ of bone were destroyed; the anterior wall of the *alveoli* was in part eaten through; and the first, third, and fourth molar teeth had dropped out.

During the last month, the course of the disease was void of fever; the patient's general health was good, with the exception that once in the beginning of January she had laboured for eight days under slight rheumatism of the right shoulder. The treatment was accordingly of the expectant character; and excepting the use of a mundifying lotion for the mouth, nothing further was prescribed, and required to be prescribed.

The offensive smell connected with the disease, on account of which the patient required to cease from work, obliged her on the 27th of January 1846, to enter the hospital. In the beginning of February the loose piece of alveolar process was extracted, and on the 14th the patient was discharged.

On the 23d of February she was again seen, and the following was her state.

The alveolar process from the second incisor tooth to the last molar tooth inclusive, was away. The first incisor tooth was still loose; but according to the statement of the patient, it had become in some degree firmer, and appeared to be about to be retained. The last molar tooth stood firm in its socket. Immediately before it was a small portion of the bone still uncovered, and on both sides of this uncovered fragment of bone were seen arising granulations which tended to cover it. The posterior part of the gum, which was not destroyed, had, in the entire length of the removed alveolar process, from behind, forwards, and outwards, been drawn upwards, and filled with the granulations proceeding from the body of the upper jaw, the deep cavity formed by the removal of the alveolar process.

The general condition of the patient left nothing to be desired, and she might be considered as completely cured.

The detached portion of alveolar process, which was not entirely preserved, forms a pyramidal piece of bone, the apex of which is turned upwards, and the base below. It embraces the whole thickness of the alveolar processes, and contains in its basis the sockets, or alveoli of the first, second, and third molar tooth, and the canine tooth. The canine tooth, and the first molar tooth, which in the figure are represented in their sockets had dropped out in the course of the disease, and are represented only to render the view of the preparation more clear. Both teeth are perfectly sound; present nowhere any trace of caries, but the tips of their roots are of a dark gray colour and transparent. The detached piece of bone is one inch two lines broad, one inch two lines high, and the same in thickness. Of the two compact plates of bone which enclose without and within the spongy texture of the alveolar arch, the anterior is in the greatest part destroyed and absorbed; the posterior is in part

On the 23d of December, after Sedillot had smoothed the asperities and sharp corners of the alveolar processes, which caused constant irritation to the tongue and the mucous membrane of the cheeks, the sequestrum appeared to be less firmly enclosed. Sedillot accordingly seized with forceps the piece of bone lying exposed, and brought away the whole alveolar portion from the canine tooth to the last molar tooth, a portion of the hard palate, and the whole anterior wall of the maxillary sinus. The velum remained uninjured.

A discharge of fetid purulent matter, with some drops of blood, took place.

On the 9th of January 1846, some more portions of bone were extracted; and these M. Sedillot recognised to be the pterygoid processes of the sphenoid bone.

On the 16th February the patient expired in the third stage of pulmonary consumption.

Besides the destructive ravages in the upper jaw, the left half of the lower jaw also presented, directed towards the *alveoli* of the last molar tooth, an excavation in the bone, with rough and irregular basis. This excavation was of the size of a hazel nut, and was filled with blackish purulent matter, in which floated the macerated ends of the lacerated nerves of the teeth. Around the excavation the substance of the bone was of a red colour, as if injected. The periosteum was very easily detached from the bone; and in the upper jaw the dissector observed before the infra-orbital canal, no longer any trace of the infra-orbital nerve, which had all been completely dissolved in the surrounding matter.

These two cases may be regarded as good examples of the destructive effects of this disease. In both, the bones of the face had been killed, as it were, to a very great extent; and in the second case, to this affection of the bones was superadded tubercular disease of the lungs terminating fatally. Death of the bones had been preceded most probably by inflammation, and detachment of the periosteum, perhaps death, of this membrane.

(B.) COURSE OF THE DISEASE IN THE LOWER JAW.

In considering the course of the disease of the bone in the lower jaw, we rely exclusively upon the German observations, and so far as we treat of the new formation of bone, which so uniformly attends the disease in its first stage, it is particularly the observations made in Nürnberg, which, being fully examined and investigated on all sides, serve as a standard. Of equal importance with these are the observations made by Lorinser, in which not less the subject of new formation of bone (*osteophytum*) is considered; and lastly, some observations by Neumann, in which the subject of new formation is no longer a question, illustrate the course of the disease in its final stage.

According to the observations made in Nürnberg, the disease in the lower jaw pursues two courses; one acute, the other chronic.

a. THE ACUTE FORM.

This is distinguished from the chronic form chiefly by the violence of the morbid phenomena, the presence of synochal fever, and the rapid course of the disorder.

If the disorder begins, as in the chronic form, with toothach, this pain is at once very violent, remains only a short time confined to the tooth, and quickly spreads to the half of the jaw in which the suffering tooth is situated. This pain quickly radiates thence into the neighbouring soft parts; that is, the cheeks, the chin, and even the neck, and the temporal region. It is continuous, and is aggravated from hour to hour. The gum is swelled, and likewise the cheek and throat, which present a solid elastic tense swelling, which is most painful when pressed. The cheek is affected by erysipelatous redness; and after previous cold shivering, smart febrile action, with dry heat of the whole person, follows; thirst is intense; the tongue is loaded; the head is painful; the pulse is hard, full, tense; gastric symptoms evince their presence in inclination to vomiting, constriction in the epigastric region, bitter taste in the mouth, and similar phenomena.

After some days one or more abcesses in the gum burst, and discharge a fetid thick phlegmonous purulent matter, first at the spot of the affected tooth. The gum surrounds like a rampart, deep red in colour, the teeth, which speedily become loose and drop out. The swelling of the soft parts extends to the soft palate, the *velum*, the parotid gland; and of this, difficulty in swallowing, immobility of the lower jaw, and profuse secretion of saliva, are the consequences.

These symptoms of phlegmonous inflammation, meanwhile, are not of long duration. In the second week of the course of the disease, the scene undergoes a considerable change. The severity of the pain is diminished; but the gum becomes always softer, thinner, loses its bright red colour, and becomes livid in some points, which are at the same time found to be the seat of the same number of forming abcesses. The swelled cheek also becomes less prominent, and is softer; and only in the direction of the lower jaw does it longer retain its tension and firmness. The suppuration, in like manner, loses its phlegmonous character; it becomes thin, copious, sanious. Gradually the edges of the multiplied abscesses are drawn backward upon the gum; the bone begins to be laid bare; the probe ascertains it to be partly smooth, partly rough; and passes over its surface in all directions beneath the undermined and detached gum.

With these local changes, corresponding ones in the general health proceed. The synochal or inflammatory character of the fever is gone; and is converted into hectic or consumptive fever. The pulse is still sharp, small, quick; great exhaustion, dry cough, fits of shivering alternating with night-sweats, follow. The skin is dry, burning, hot; the functions of the intestinal organs are deranged, principally in the way of constipation. The local symptoms continue to extend; the gum is in general absorbed; the jaw-bone lies exposed to view, and appears to project into the cavity of the mouth; the swelling of the cheek becomes soft and boggy; its colour is partly livid; a most offensive-smelling sanies, in which the soft parts appear to be dissolved, is secreted; and at length, amidst continuing symptoms of consumption, after the disease has endured from two to three months, death takes place.

CASE SEVENTH. (10th of Von Bibra and Geist.)—Barbara Keim, aged twenty-two years, well-formed, of middle size, brunette, of strong constitution, regular as to menstrual function, without prominent disposition to disease, free from dyscrasia, especially strumous; had worked for four years without intermission in a phosphorous-match manufactory, and had the duty of numbering the matches, a work which at that time was still performed in the drying room.

During the first three years and a half of this occupation, she had continued constantly in good health. First, in the course of the last half year, she had occasionally suffered from toothach in the right lower jaw, but to which she had paid little attention, as in early years she had often suffered from toothach and had lost several teeth by caries. As the pain moreover came on periodically, she continued at work with so much less apprehension.

In the beginning of the month of February 1843, she was repeatedly attacked by toothach, and again in the right side of the lower jaw. The pain, however, now no longer left off as before, but quickly attained a high degree of violence, remained not confined to the carious tooth, but spread, tearing and boring over the whole jaw-bone, over the cheeks, and radiated even to the chin, the neck, and temporal region. At the same time appeared violent febrile symptoms, with intercurrent cold shiverings; and the gum and cheek became partly swollen and covered with erysipelatous redness.

On the 4th of February the patient entered the Sick Institute, now given up.

Upon examination the practitioner found the right cheek, as high as the lower eyelid, as also towards the mouth, chin, and neck, affected with tense hard swelling; the most tense portion being in the direction of the lower jaw. A deep-seated, boring, throbbing pain, concentrated in the angle of the lower jaw, radiated thence in all directions upon the swollen soft parts. This pain was aggravated by pressure to the most intense degree. The gum of the affected half of the lower jaw was, from the region of the chin to a great depth towards the ramus, very much swelled, elastically stretched, of deep-red colour, and highly sensible; in like manner the mucous membrane of the cheek; and from the region of the angle of the lower jaw, it was possible to press forward towards the first molar tooth a very bad-smelling, thick, phlegmonous, purulent matter.

Of the teeth of the right half of the lower jaw, the first and fourth molar teeth were carious; the others had already been lost; the incisor teeth and the canine tooth were sound.

The tongue was swollen; the taste in the mouth bitter; the patient had violent headach, weight at the epigastric region, flatulent eructations, squeamishness, constipation, violent active fever.

The remedies ordered were, an emetic; fifteen leeches over the region of the angle of the lower jaw; afterwards the Vienna laxative wall with sulphate of soda; and a mouth lotion consisting of elder flower water and simple oxymel.

The emetic was followed by discharge of a quantity of acid and bitter smelling mucous fluid. The general symptoms were alleviated.

The local disorder meanwhile increased rapidly from day to day. The swelling of the gum continued to enlarge, became more tense, extended upon the soft palate, the palatine *velum*. Difficult deglutition followed, the secretion of saliva was increased, and great difficulty in moving the lower jaw was felt. Suppuration increased considerably, and remained of good character, though in the highest degree offensive to smell.

Eight leeches were applied upon the angle of the lower jaw; over the parts was directed to be rubbed ointment of the gray oxide of mercury with oil of hyoscyamus, alternated with a poultice. Internally, the patient was to take the nitrous mixture and iodine.

In the second week of the course of the disease, the four incisor teeth and one molar tooth were loose; suppuration was abundant and sanious, and of a dirty red-brown colour; the gum, in several parts, was soft and livid, and at the external, as well as at the internal surface, an abscess burst, and through the opening thus formed the probe felt the bone stripped of its soft covering, partly smooth, partly rough. Along with these symptoms, the severity of the pain was abated, but at the same time a sense of great exhaustion ensued. The patient began to cough,—had every evening an exacerbation of fever,—lost entirely all appetite,—perspired much during the night and towards morning, and complained of urgent thirst.

In the further progress of the disease, the gum was drawn backward to a greater extent from the alveolar arch, and became daily more livid. After being distended with purulent matter, it burst into several abscesses, the outlets of which formed several fistulous passages; and through these the probe passed in all directions along the surface of the entire half of the jaw. This was the case both with the outer and the inner side of the jaw-bone. There also the bone was in in a short time either entirely stripped of its soft coverings, or it was only loosely surrounded, and floated in a very bad-smelling brown-red coloured matter. The first and the fourth molar teeth, and the four incisor teeth, at this time either dropped out spontaneously, or were pulled away by the fingers. The swelling of the cheek, which was often tinged with a dark red flush, continued still rather firm, but it had become more soft, receiving the impression of the finger, in individual spots, as if fluctuating, but without any abscess having been formed, and opening externally. The lips also were swelled; of the eyelids, the lower was œdematous; and during the last week of life, the left cheek began to be painful and swelled.

The disorder was so far in the second stage that the gangrenous destruction and suppuration of the soft parts had been completed. The intense pain had almost entirely ceased, but the fever was at all times distinctly the hectic of consumption.

The night-sweatings continued; from time to time fits of cold shivering came in a very irregular manner; dry cough likewise continued; the irregularities in the function of digestion persisted, amidst great increasing emaciation, with unquenchable thirst, and dry burning skin.

With the view of supporting the strength, and correcting the distinctly putrid, and partially gangrenous local process, aromatic bitters were prescribed; *Calamus aromaticus*, snake-root, bark, opium, mineral acids; and an aromatic lotion for the mouth, with tincture of myrrh. All were unavailing. The symptoms of consumption and hectic daily increased, and the patient expired, after severe sufferings, on the seventy-third day from the commencement of the disease.

Inspection of the body eighteen hours after death disclosed the following state of parts.

The body was greatly emaciated.

The right cheek was swelled, soft, of a bluish colour. When these were separated from the lower jaw, an unctuous, thick, very fetid, gruel-like fluid, of red-brown colour, was met with. Neither gum nor periosteum, nor muscular layer of the cheeks, could be any longer distinctly recognised. All these soft parts appeared to be dissolved in this gruel-like fluid, which was enclosed in the skin of the cheeks as in a sac. The right half of the lower jaw lay in this gruel completely denuded, and without any connection with soft parts, and after separating the articular connections which were still firm, they were taken out without difficulty.

Upon opening the cavity of the chest, the lungs were found occupied by tubercles; but no softening, and no formation of vomica, had yet taken place. This was to be expected, as, during the course of the disease, the symptoms of the second and third stage of pulmonary consumption had never been observed.

In the abdomen, no deposit of tubercles was observed in the mesenteric glands.

There was great bloodlessness and flaccidity of the large organs; the Heart, the Liver, the Spleen, and the Kidneys.

The blood in the large venous trunks was thin, fluid, and dark in colour.

Description of the Lower Jaw, which is deposited in the Pathological Museum of the Surgical Clinical Establishment at Erlangen.

On the outer as on the inner surface of the alveolar arch of the right lower jaw, was deposited a newly-formed mass of bone; which begins, partly in large connected masses, partly in insulated patches, round the neck of the articular process, leaving completely free the articular surface, and extends thence over the outer as well as the inner surface of the articular and coronoid processes towards the angle of the lower jaw. On the neck of the articular process, and at the spot where it forms insulated patches, the new formation is extremely slender and fine, as if the bone were only touched. But as it descends on the outer surface of the ramus, and at length approaches the angle of the lower jaw, it is gradually becoming thicker and stronger in mass, and presents on the angle of the lower jaw a compact mass of bone from one line to one line and a half thick, which, without touching the bone, in part winds round the lips of the jaw, until it is connected with that on the inner surface of the ascending *ramus*.

On the inner surface of the lower jaw the new formation extended almost to the chin; and here were found above, opposite to the alveolar processes of the incisor teeth, three large deposits of new formation expanded in the insular manner. On the outer surface this was continued to the fourth molar tooth; and small deposits were found as far as the alveolar process of the right canine tooth. On the left half of the lower jaw were found in the region of the first and second molar tooth in like manner two insuli-form expanded deposits of slender fine formation.

The morbid new formation was everywhere very loosely seated on the bone; it was nowhere organically connected with the bone. The slender parts may be easily scratched off with the nail, and beneath is found the surface of the bone completely smooth; some parts of it were already weathered and fallen off. This is true, however, only of the more delicate formations at the neck of the articular process, and where the new formation has the disseminated insular disposition. The new formation in the angle of the lower jaw is, on the other hand, a solid compact mass of bone.

(The figure shews the morbid new deposit in much smaller compass and extent, than that in which it was found immediately after death. The spots in which the original bone still appears between the new deposits, were at first all covered, and they have become denuded from gradual action of the air.)

At the point at which the newly-formed bone is most slenderly deposited on the jaw-bone, or where the insulated patches are formed, this new matter presents an uncommonly fine fibrous structure like that of a fine bath sponge after being dried and pressed. Innumerable vascular holes open in it, and give it this porous appearance. But as it descends deeper on the *rami*, and at the same rate becomes a thick and compact mass, the fibrous structure disappears; and here, and especially on the angle of the lower jaw, the new formation becomes a homogeneous solid mass of bone, the surface of which presents a smoother aspect; while here also, though in smaller amount, vascular orifices appear. The colour of the new formation is in part a dirty gray-white, inclining to brown, partly a dirty yellow-white, passing in some spots into reddish.

The alveolar process of the right and left last molar tooth is perforated by holes, and has, from the evident entrance of vascular orifices, an appearance of having been worm-eaten or carious. The *alveoli* or sockets, which are open, shew nothing abnormal. Hanging on the right side are the first, second, and third molar teeth, all carious, and along with them the incisor teeth, which during the course of the disease dropped out. The other molar teeth on the right as on the left side, are partly loose, and partly had previously been lost and their *alveoli* closed.

The lower jaw-bone itself shews everywhere a perfectly smooth surface below the new deposit, and must, according to its external signs, be regarded as a perfectly sound bone.

This case, observed by Dr Geist, the author adds, is the only one in which, at the period, the disease had taken place with phenomena of phlegmonous inflammation, with speedy transition into gangrenous destruction of the soft parts, and after the short space of only seventy-three days, had a fatal result. Next to it stand some of the cases observed by Lorinser with fatal termination, though the duration of the disease was at the shortest five months. These further are placed, by their great similitude in morbid symptoms, more closely to the case now adduced, than those pursuing a chronic course; and he gives therefore one of the cases which Lorinser has published in his Essay.

[It is not easy to understand, in reference to the foregoing case, the reason why the author pronounces the jaw-bone to be entirely sound. It may be that it was in appearance not different from a sound bone. But that it is to be regarded as a bone entirely sound, seems an inference so little supported by the facts, except those of mere external aspect, that it appears to us impossible to admit it as well founded.

Appearances are always and perhaps unavoidably fallacious, in judging of morbid changes and deviations from the sound state. These deviations are often so slight that they escape all but the well-practised and experienced eye. Yet even in this case, it may, from the description, be inferred, that the bone was not in a sound state. The perforations in the alveolar arch, and its worm-eaten appearance are sufficient to shew that this portion was very considerably diseased. Probably, the author understands that this part was in a diseased state, but that the rest of the jaw-bone still preserved its sound condition. It is simply possible, as already said, that the external and superficial appearances did not denote the presence of disease. But the bone was entirely killed, completely deprived of life; and if carefully compared with a living bone, one still possessing the characters of having been alive, the difference would have been recognised, if not easily, at least with sufficient distinctness and certainty to preclude allowing it the character of a sound bone. It was a bone deprived of life while the rest of the body was still living; and there are always characters in colour, in aspect, and in internal appearance, by which it is possible to distinguish such a bone from one, in which life has continued, while it continued in the body at large, and which has only ceased to live when life ceased in the system generally.

It may here be remarked that the case as described by the author, presents all the characters of the fatal and unmanageable disorder called ACUTE NEKROSIS. This disease, though probably taking place in any bone, is most usually witnessed in its perfect form in the thigh bone, and the bones of the leg, especially the former. It appears in the form of general, painful swelling, affecting the whole of the soft parts covering the femur, along with severe and intense febrile symptoms, at first inflammatory, afterwards of a typhoid and putrid character. In the course of a few days, suppuration of the subcutaneous and intermuscular cellular tissue takes place, forming large caverns and bags containing matter between the muscles and down to the bone. The muscles are loosened from their attachments to the fascia and are found completely dead, while large masses of dead cellular tissue are discharged by openings either spontaneous or artificial. The bone itself is found more or less extensively stripped of periosteum and fascia; and lies loose and detached amidst the soft parts dissolved and dead. Often the veins are inflamed and obstructed; sometimes the arteries are inflamed; they are always firm and hard as if killed by the inflammatory action of the disease.

The bone itself is entirely killed. Its colour is whitish or yellow, in some parts dark, not the pink-blue of healthy bone. The marrow is dark red, occasionally containing sanies and bloody purulent matter; often dissolved or softened.

This disease presents not a few of the characters of Diffuse Inflammation of the Cellular Tissue, or Inflammation of the Adipose Membrane; and perhaps it does not materially differ from that affection except in degree. It appears at first with very much the same symptoms, general and local; and it seems to be seated in the same textures, or at least to affect the same textures as acute *Pimelitis*.

Under all circumstances, it is a fact of much interest, in an etiological point of view, that the presence and action of absorbed phosphorus in the vessels and membranes of the face, induces a disease so exactly similar to acute and chronic Nekrosis, that it is impossible to draw, between the poisonous effects of phosphorus and the disease any well-marked difference.

For further information on the nature of acute Nekrosis the reader may consult the work referred to below.[1]]

CASE EIGHTH. (11th of Von Bibra and Geist.)—F. A., aged twenty years, of slender figure, feeble constitution, chlorotic, had been occupied for five years in a lucifer-match manufactory. After a short time of her residence in the place, she was attacked by dry cough, with tightness in the chest. At the end of the month of July 1843 the patient first remarked a swelling in the region of the right cheek, which at the same time was painful, and of an erysipelatous red colour. At the same time she felt fleeting stitches along the row of the teeth and the processes on the right side of the lower jaw, the movement of which was impeded, and accompanied with pain. To these symptoms, which the patient ascribed to several teeth which had become loose, she at first did not pay attention, and continued at her occupation. When subsequently the gum of the lower jaw began to swell, and several teeth dropped out, the patient remarked at the same time that some drops of purulent matter trickled away from the places of the teeth on the right side. The swelling of the cheek also enlarged downwards towards the neck, and it burst simultaneously in several spots. The matter discharged from these abscess openings was like that which issued from the sockets of the teeth, of a most offensive smell. Hitherto, however, the patient used no other treatment than some ordinary domestic remedies; and the first time that she determined to apply for medical assistance to the Hospital, was when labouring under violent cough, with evening fever, she was unable any longer to leave her bed.

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[1] Elements of General and Pathological Anatomy, &c. By David Craigie, M.D., F.R.S.E., Fellow of the Royal College of Physicians, Edinburgh, &c. Second Edition, Edinburgh, 1848, 8vo, pp. 455 and 456. Book III. Chap. v., Section ii.

Upon her admission into the Surgical Department, upon the 24th November 1843, it was ascertained that the right half of the lower jaw in its whole extent could be felt rough and stripped of its soft coverings. The surrounding parts were filled with brown-coloured fetid sanies. The gum was perforated by several passages; the teeth were partly hanging, partly loose; the secretion of saliva was augmented; the soft parts on the neck below the angle of the lower jaw, were penetrated by abscesses, purulent cavities, sinuses; the skin for the most part undermined, deprived of the subjacent cellular tissue, of a brownish discoloured hue.

There was considerable cough, the expectoration purulent, the appetite bad, thirst increased. On the right side of the chest pricking pain was felt during inspiration. Percussion elicited toward the axillary region a dull sound. Respiration in the same place was not audible.

The abdomen was somewhat distended; sensitive in the region of the stomach. The skin of the whole person was hot and dry. The pulse was rapid, small, and soft.

During the further course of the disease, Lorinser strived to sustain as much as possible the digestion and the general strength of the patient by suitable internal remedies. The disease, however, shewed itself to be of so mortal a character, that after the lapse of four weeks, on the left side of the face an œdematous painful swelling appeared on the soft parts covering the angle of the lower jaw, and accordingly allowed the surgeon to infer the further extension of the disease in like manner over the left half of the jaw. The secretion of purulent matter was so abundant, that new sinuses were formed in the neck, and some of these required to be laid open. The sickening smell diffused round the patient could scarcely be borne during the night. The cough sometimes left the patient for some hours, but only to return with greater violence. The pain in the chest extended upwards towards the shoulder. Obstinate constipation alternated with diarrhœa, and amidst increasing hectic fever, the strength of the patient wasted from day to day. In this manner she continued for three weeks of February 1844.

The greatest alleviation was effected by means of tepid general baths, emollient warm applications, and the occasional use of aromatic lotions for the mouth. Narcotic remedies, even in large doses, procured for the patient but little relief. Amidst violent pains both in the face and in the right side of the chest the exhaustion of the patient continued increasing, and death took place on the 23d of February 1844.

Inspection of the body disclosed the following facts.

The body was greatly wasted. The skin over the whole extent of the lower jaw had assumed a bluish discoloration, especially on the left side over a distended sac, as large as a dollar, which was filled with dark-brown fluid. On the right side of the neck, and below the chin, the skin, along with the cellular texture, was in several different spots destroyed; the lower jaw was, in its entire extent, nekrosed, inclosed in a sanious cavity, and presenting on the outer and inner surface of its right *ramus*, as also on the coronoid process of the left *ramus* NUMEROUS BLACK DISCOLOURED OSTEOPHYTA, OR NEW FORMATIONS OF BONE. The left half of the body of the lower jaw was on its outer surface smooth, completely stripped of periosteum, and only at the articulation and on the inner surface of the *Symphysis menti* did the bone hang with the soft parts, though loosely, together. The mucous membrane of the mouth was perforated by numerous purulent sinuses and sanious collections.

The vault of the cranium was thin. The *pia mater* was opaque. The substance of the brain was firm; the choroid plexus was strongly developed.

Both lungs were adherent to the walls of the chest by cellular tissue. The middle lobe of the right side, and the lower lobe of the left side were occupied by tubercles, firm, and filled with frothy bloody serum. Both upper lobes were free from tubercles, and containing air and serum. Between the lower lobe of the right lung and the diaphragm was found an encysted cavity, containing about two pounds of discoloured sanies, and by which the lower lobe of the same lung appeared to be compressed. The surface of the pulmonic pleura applied over this cavity was thickened and partially destroyed.

The heart was pale. In the pericardium were contained two ounces of clear serum.

The mesenteric glands were infiltrated with tubercular matter.

The muciparous follicles of the intestinal canal were swelled. The intestinal mucous membrane was destroyed by tubercular ulcers.

b. Chronic Form of the Disease.

Under this head, the author arranges those instances in which the disease attains a duration of from at least six months to two and three years, and even longer. It is nevertheless not understood, that with the longer duration of the disease, the morbid phenomena are also milder in degree. These symptoms are nevertheless often very violent, particularly the painfulness; though there are not wanting among this class, cases in which the disease exists in a mitigated form for years, without peculiar symptoms. The course in this case is so variable, that it is difficult to describe it in general characters. It is principally to be remarked, that between the acute and the chronic form of the disorder, no well-marked boundaries can be drawn. The transitions from the one to the other condition are multiplied.

When, as has already been remarked, after the disease has continued for six and more months, the gum is drawn backward; when abscesses have been formed in it; when more or fewer teeth have partly dropped out or been extracted; and these phenomena have been proceeding with fever symptoms partly slight, in part rather violent, greater or less severity of pain, disorder in the first passages;—we usually behold the alveolar arch denuded, projecting within the cavity of the mouth. This, however, is often not the case. The gum is not merely not drawn back; it becomes even more firm, more hard, embraces the alveolar processes in the extent of the morbid part, like a wall, and even becomes fungous. Granulations spring from it, especially where it surrounded the *alveoli* of teeth which have come away; these become luxuriant in growth; and consequently the granulations appear to proceed from the alveolus itself. At the same time, the cheek remains constantly swelled, often of a slight erysipelatous red colour; sometimes pale. It is always in the direction of the lower jaw, most intensely swollen and hardest; and if the observer examines it here carefully, he has the sensation as if the lower jaw were thickened, and is convinced that the solid swelling of the cheek is not seated in it. Abscesses are formed in variable amount, partly in consequence of small circumscribed phlegmons, partly in the form of lymph-abscesses, which discharge more or less bloody purulent matter or sanies. This occurrence may take place at an early or a late period of the distemper; and in one instance its first occurrence was after the end of two years. Usually these abscesses burst at the lower edge of the lower jaw; but in other cases at a greater depth, below in the neck, or in the region of the ear, or of the mouth. The probe advances, sometimes into the cavity of the mouth, sometimes to the bone, which is felt partly smooth, partly rough, but sometimes also only to the soft coverings.

In the further progress of the disease, the cheek not unfrequently becomes softer and the immediate environs of the fistulous openings become discoloured; they even readily bleed. The discharge consists of fetid bloody sanies, which may by slight force be expressed from the surrounding soft parts. If the gum is perforated by hollow passages, these communicate chiefly with the fistulous openings of the external skin, and there open in various winding passages, which run through the skin and the subjacent soft textures often to great extent, and give cause to the formation of purulent sores.

Not unfrequently it happens, that the disorder remains stationary at one stage of its development for a long time, and admits of a degree of comparative well-being. The painfulness is abated, often scarcely perceptible; no fever is observed; good appetite returns; and the strength, which had been gone, appears again about to be restored. Without any particular occasion, however, pain with febrile symptoms returns most suddenly; swelling anew attacks the cheek, or the other cheek which had hitherto escaped, followed by increased suppuration; in one word, all the local symptoms already described are renewed, and often with greater intensity than previously.

It is now, however, for the farther progress of the disease of great importance, whether the individual attacked be of good or feeble constitution, strong or powerless, dyscrasial or free from dyscrasia, especially not scrofulous, and without or with phthisical diathesis; further, whether the local disease has attacked the bones to a greater or less extent.

If the diseased person be of strong constitution, free from dyscrasia, without phthisical diathesis, and the disease only partial, Lorinser and Neumann have observed exfoliation of large or small fragments of bone; and the patient afterwards restored to comparative health. Subsequent surgeons, and Dr Geist himself, have witnessed even the exfoliation of the entire half of the jaw, yet recovery afterwards take place. The morbid phenomena are in these favourable cases very mild. The pain almost entirely disappears, or occurs only at intervals. The lower jaw, which is attacked, is entirely or partially stripped of all its soft parts, is separated from the sound half, and projects quite moveable within the cavity of the mouth. It is of a brown dirty colour, often half rotten; a quantity of very fetid matter is secreted; and at length the half of the jaw-bone, or part of it, either comes away of its own accord, or is with little difficulty removed. Afterwards the healing process commences. In the bone removed in this manner, a new formation of bony matter is either not perceived, or it is stopped in a consecutive process of sanious suppuration.

When, however, the counterpart of this is the case, according to the observations of Lorinser and Geist, either genuine hectic fever ensues and cuts off the patients; or softening and ulceration of tubercles in the lungs follows, and the patients die with the symptoms of the third stage of pulmonary consumption.

CASE NINTH. (12th of Von Bibra and Geist.)—Margaret Pillhofer, twenty years of age, of sound fresh appearance, fair, well-formed, never unwell, menstruating easily and regularly, free from marks of *dyscrasia*, free from phthisical diathesis; worked for four years without intermission in a lucifer-match manufactory, was three years of this time engaged with the duty of fixing the matches,—one year, and indeed the last, with that of numbering and putting them in bundles.

During the time of working, she often suffered from toothach, especially in the last year of her employment, and the third and fourth molar teeth of the right lower jaw, which were both carious, dropped out in the course of this last year. From time to time some swelling of the gum on this half of the jaw had taken place, which, however, had again subsided after remaining a short time. So long as she was occupied in the manufactory, she was repeatedly attacked by toothach, which was followed by swelling of the gum and the lower half of the cheek. The symptoms, however, did not now subside as formerly, and the patient consequently gave up work and applied for medical assistance.

The gum of the right half of the lower jaw was swelled, reddened, hard, painful upon pressure; and, in like manner, the right cheek was affected. Another physician, to whom she applied, recommended against these symptoms antiphlogistic measures; leeches were applied, antiphlogistic laxative medicines and mixture were administered with the effect of causing the cessation of the pain, though the swelling of the cheek and the gum persisted. This treatment had been continued from the space of six to eight weeks, after which the patient again returned to work.

In the month of November 1846, consequently two years and three months after the commencement of the disease, the patient presented herself to the author (Dr Geist, we understand), and then exhibited the following symptoms.

The right cheek was swelled, firm, most firm in the direction of the lower jaw, a little reddened, without being painful. The lower jaw appeared thickened, as if swollen, and at its edge, in the middle of the body of the bone, were situate two small fistulous openings, which were one inch distant from each other. They were smooth, without luxuriant edges, were situate in the midst of a slightly inflamed elevation, the size of a groschen piece, and secreted a little thin yellowish matter. The probe went through them in a straight direction to the jaw-bone, which was found here stripped of soft parts and smooth. These fistulous openings had been first formed six weeks previously, from two small abscesses. All the rest of the skin of the cheek and neck was healthy. The gum completely covered the right half of the lower jaw; it was swelled, reddened, and had covered the *alveoli* of the third and fourth molar teeth, which had at a former period dropped out. From this, as also from the *alveoli*, granulations were issuing, and the observer nowhere perceived an opening of an abscess or suppuration.

The appearance of the young woman was fresh. She felt herself strong, was perfectly free from pain, had excellent appetite, and regular digestion. The respiration was unaffected; the only symptom of imperfect health was that for twelve months menstruation had been suspended.

This case is the only one of the instances which had taken place in Nürnberg, in which, with moderate extent of the local disorder, the affection had continued with symptoms so mild, and, indeed, for the long period of two years and three months. The lower jaw, nevertheless, was stripped of its soft coverings; from the manifest swelling of this bone, it may be inferred that new formation had taken place; and it is scarcely possible to doubt that, in a time shorter or longer, the scene shall undergo an essential change, and the morbid symptoms will assume a violent character.

It is further to be observed, that this case is the one in which the illness of the patient took place in another manufactory.

CASE TENTH. (13th of Von Bibra and Geist.)—Kunigunda Burkert, thirty-one years of age, of fair complexion, middle size, scrofulous, and of phthisical diathesis, worked for the space of three years in a phosphorous-match manufactory, and had been engaged in the duty of numbering and packing the matches, and also alternately in that of fixing them in the frames. Immediately after the commencement of working, she was affected by cough, and was, during the three years of the time of her working, several times attacked by it. Towards the end of the third year of working, in the month of April 1845, the disease of the jaw began.

Already, previously, she had often been attacked by toothach in the right side of the lower jaw, but which, as is usually the case, caused no impediment to the continuance of her occupation. Swelling of the gum and cheek quickly came on, abscesses in the gum burst, fetid purulent matter came away, and speedily became sanious; in the right side of the lower jaw was felt great pain, which was only exceeded by the severity of the general disorder, which, at the same time, began to be developed. The patient was soon after the beginning of the local disorder attacked by cough with purulent expectoration; she had night-sweats, lost appetite, suffered from irregularity in the digestive functions, hectic fever, and died in the sixth month after the commencement of the local disorder.

Upon inspection of the body, the lungs were found occupied with tubercles partly crude, partly dissolved, and in various parts their texture was hepatised.

The lower jaw, removed after death, presented the following changes.

The right half of the jaw is surrounded on the outer as on the inner surface with a new formation. This commences from the articulation and the coronoid process, as also the sigmoid notch (*incisura sigmoidea*) and leaves uncovered only the articular surface of the first-mentioned part. The new formation is continued of pretty uniform thickness, from half a line to one line, exactly surrounding the parts mentioned on the outer as on the inner surface of the process of the jaw, to the angle and over the body of the angle, as far as the incisor teeth, and leaves uncovered only at the outer side, above the angle of the lower jaw, a large triangular portion, and at the inside of the same angle a small quadrangular portion of the jaw-bone. In the region of the left molar tooth the new formation descends more towards the inferior margin of the bone, and leaves the alveolar portion in its great extent uncovered, since it ascends in the elevation only in the region of the canine tooth and the incisor teeth. On the outer surface of the left lower jaw is found only in the region of the canine tooth an insular-shaped large deposit of newly-formed bone. On the inner surface of the lower jaw, the new formation is continued immediately upon the left half, in so far as it runs on the lower margin of the jaw, and is expanded only in the region of the incisor teeth, and over the alveolar processes, and terminates at the first molar tooth. All that spot upon the outer surface of the bone, when a portion of this and the new formation has been subjected to microscopical examination and chemical experiment, we again see distinctly how the new formation is deposited upon the bone, and the latter distinguished even in its diploetic or cancellated tissue, exhibits throughout a perfectly sound structure.

The newly-deposited matter has in this preparation a pretty uniform shape. It shews a partly fibrous, partly lamellated joining, is of grayish-black-green colour, mossy-like aspect, and is, especially at the outer surface of the process, worm-eaten. It resembles most the OSTEOPHYTUM of Rokitansky in FORM OF A BONY MASS EFFUSED UPON THE BONE, AND IN THE FLUID STATE. Individual parts are still covered by periosteum: and these accordingly present an aspect smoother, furnished with fewer vascular orifices, while those parts in which the periosteum is destroyed, present the gnawed, worm-eaten pumicestone-like aspect.

The alveolar margin and the rest of the bone, so far as it is uncovered, shew throughout no deviation from the normal character, and must be considered as altogether sound. The same is the condition of the *alveoli*, which together present normal structure, and nowhere a larger amount of vascular holes than in the sound state, or a worm-eaten appearance of their substance itself.

Of the teeth on the right side, only the front tooth is retained perfectly sound; on the left side the third and fourth molar teeth, in both of which the crowns are carious. In the *alveoli* of the fifth molar teeth stand a pair of carious roots. The other teeth are altogether gone.

This preparation is in the possession of Von Bibra.

CASE ELEVENTH (14th of Von Bibra and Geist) is that of Margaret Rumpler, observed by Heyfelder, given in last number, at pp. 124 and 125.

All that is required, to complete the history of this case, is the account of the state of the two divisions of the lower jaw.

Left half of the Lower Jaw.

This is accurately separated from the other half between the incisor teeth of the right and left side. The jaw is completely void of teeth. Only in the most posterior *alveolus* stands the wisdom tooth, without having yet raised itself above the socket. From the sawed surface of the lower half of the jaw-bone, one piece half an inch broad, and from the middle of the body of the jaw-bone, a piece more than a quarter of an inch broad of the new formation were removed, both for the purpose of microscopical and chemical examination.

The *alveoli* of the incisor teeth, the canine tooth, and the first molar tooth are perfectly sound. Those, on the other hand, of the second, third, and fourth molar teeth are carious: their partition walls partly absorbed, and equally so the alveolar margin within and without, so that especially at the place, and in the circumference of the third molar tooth, a loss of substance in the alveolar process appears going on, at least to the middle of the alveolus. The external as the internal side of this half of the jaw is covered with newly-formed bony matter. This new formation begins within, as without, round the neck of the articular process, leaves the articular surface completely free, equally so the apex of the coronoid process, but partly covers the sharp edge of the semilunar notch (*incisura sigmoidea*). It is here, as round the upper half of the coronoid process, covered by periosteum, which covers this part of the bone like a smooth-stretched cloth drawn over a solid body. The new formation lying under the periosteum, as being covered, is here very slender and fine, its surface smooth, and very few vascular orifices are seen to open in it. The greater the depth to which, on the outer as on the inner surface of the *ramus* occupying its whole breadth, it descends towards the angle of the jaw, the more thick and equable it becomes; but remains at its posterior half, and as it covers the angle of the lower jaw, smooth and furnished with few vascular orifices, while it here is still covered by periosteum, which, partially ossified, forms its uppermost layer. So is it on the outer as on the inner surface.

The new formation is deposited uniformly on the outer and inner oblique lines of the *ramus* of the jaw, towards the horizontal part of the jaw. But as soon as it comes to the region of the last molar teeth *alveoli*, it sinks within and without, and leaves unoccupied in all the remaining part of its extent. At the angle of the lower jaw, it is particularly thick, presents a well-shaped elevation, which is bounded particularly behind, and this limitation Professor Heyfelder had occasion to take for a spontaneously formed line of demarcation. While the new bony formation is continued in a uniform manner to the place where the bone was sawn through, it covers this within as without, leaving the alveolar process unoccupied, pretty regularly, to the thickness of at least one line, and there are here only two principal differences to be remarked. The part of it situate below, as also that covering the angle of the jaw is still clothed with periosteum, and hence smooth, without many vascular orifices. The other portion shews an uneven surface, with very many vascular orifices open in it; it appears, accordingly, worm-eaten, like pumice-stone, or spongy, and it presents many depressions and eminences, which rise, especially on the inner surface, to wart-like growths. The colour of the part of the new bony formation covered by periosteum is a reddish-yellow; that of the uncovered part, a dirty green-gray, the junction partly lamellar, partly fibrous. In no point is the new formation firmly fixed on the bone; it may everywhere be easily detached, and we then find the subjacent bone perfectly smooth, its sections brilliant, its diploe quite normal; in one word, according to all appearances, sound.

The preparation is in the possession of Professor Heyfelder.

The Right half of the Lower Jaw.

In this specimen, the new formation began in a very fine form on the outer and inner surface of both *rami* of the jaw, covering them in their whole breadth and on the margins; it shews a fine foliated junction, but is firmly connected, and in like manner firmly fixed upon the bone. Its first beginnings appear particularly to be confounded with the bone, and are scarcely to be distinguished with the naked eye as deposited masses of bone. Under the magnifying lens, however, and, still better, under the microscope, it is distinctly perceived that between them and the bone no organic connection exists. The new bony formation, here partially clothed by periosteum, shews a smooth appearance, and fewer vascular orifices are perceptible. In an uninterrupted manner, and presenting a homogeneous mass of bone, and the more deeply descending, the more increasing in bony mass, the new formation covers the outer as the inner surface and the lower margin of this half of the jaw, and is entirely the OSTEOPHYTUM OF ROKITANSKY IN THE FORM OF A BONY MASS EFFUSED UPON THE BONE, AND COAGULATED IN THE FLUID STATE. In the region of the angle of the lower jaw are found two compact layers of new formation, one upon the other; one below, which immediately covers the bone, and an upper, which, forming an irregular segment of a circle, proceeds from above, from the side and from below, and at its margin presents a swelling elevation, as if it had been stopped in the fluid state. Along the whole length of the alveolar arch, the new formation is continued to the sawed section of the jaw at the second incisor tooth, presents at the alveolar arch itself a finer, more fibrous, and more foliated texture, and appears here to be intimately united with the bone. This circumstance has caused this specimen to give rise to the erroneous view that the bone is swelled, and that the surface of the new formation is its essential or compact substance. At the margin of the lower jaw, the new formation has a thickness of almost one-fourth of an inch; it is here most like to pumice-stone, is of a dirty gray colour, very uneven, and exhibits here, in innumerable amount, the vascular orifices already mentioned. On the inner surface, the new formation covers the bone in a similar manner; here, also, are found the most compact and thickest mass of bone below at the margin of the jaw, and the fine and thin layer toward the alveolar portion, the coronoid process, and the articular process.

When we examine the sawed surface of the jaw-bone, we perceive how this is inclosed apparently in a bony capsule. The new formation here surrounds the bone, applied more or less closely to it, but even with the naked eye we behold the sharp outlines of the bone, and see that an immediate transition of bone, or coalescence with the new formation nowhere takes place. This is particularly distinct at the inner surface of the jaw-bone. At this point, part of the newly-formed bone has been taken away for microscopical examination; the lower jaw is here uncovered, and the observer is convinced of the correctness of the inference now stated, because he finds the bone perfectly smooth, and the newly-formed bony matter quite separated from it. In like manner, the bone appears on its cut surface perfectly normal.

The consistence of the newly-formed bone is in this specimen the most homogeneous of all the specimens. It shews, on the section-surface, the smoothness and the lustre of normal bone, and is distinguished from this only by a greater amount of vascular orifices.

Of the teeth, only the fourth molar is evidently sound; the fifth still remains in the socket. The socket of the third molar tooth is obliterated; those of the canine tooth and the incisor teeth are open, and, like the whole alveolar arch, perfectly normal. The teeth have dropped out.

This preparation is in the possession of Professor Ried in Jena.

CASE TWELFTH. (15th of Von Bibra and Geist.)—Maria Höger, aged twenty-two years, married, of slender stature, chestnut-coloured hair, white complexion, with remarkably beautiful sound teeth, perfectly free from toothach, and constantly well, without any peculiar disposition to disease, worked for four years in the phosphorous-match manufactory, and was occupied in the duty of dipping the matches in the phosphorous mixture, and in cleaning the sticking-frame, the pan, and the dipping-board. Three years were spent in this occupation without Maria Hoger being once in any manner unwell. In the fourth year, however, she was several times attacked by toothach and slight swelling of the cheek, and THE WISDOM TOOTH OF THE RIGHT LOWER JAW, WHICH HAD NOT LONG BEFORE COME THROUGH THE GUM, AND WHICH QUICKLY BEGAN TO BE CARIOUS, appeared to be the initial point of this aching pain. The tooth was extracted by a surgeon, with the consequence of aggravation of the pain, increase of the swelling, and a succession of anginose symptoms.

This took place in the autumn of the year 1842. Shortly afterwards, the patient, on occasion of a fire which took place during the night, exposed herself for several hours to wet and cold; and in consequence the symptoms were quickly aggravated.

The first time at which she applied for assistance was in January 1843, and, to the 29th of that month, she had been treated by a physician with antiphlogistic laxatives, iodine, bark, soothing and emollient frictions, and an aromatic lotion for the mouth. She then applied to Professor Dietz.

There was considerable swelling of the right cheek, which in the region of the submaxillary gland on the right side, shewed a reddened and softened spot, which after the application of melilot plaster opened spontaneously. Through the opening thus formed, as well as on the side of the *alveoli*, the probe penetrated to the bone, which was felt partly smooth, partly rough. In both these directions good purulent matter was copiously discharged. Soon afterwards there was formed, at a greater depth below, in the neck, a second abscess, which was opened by art, and which left a fistulous passage, through which the probe could be carried over the angle of the lower jaw as far as the articulation. Against the febrile symptoms, the disposition to night-sweats, the great severity of the pain, neutral salts, phosphoric acid, China root, elixir of vitriol were employed; and for the local symptoms, the cinereous mercurial ointment with oil of hyoscyamus was ordered to be rubbed on the parts, and an infusion of elder flowers was used as a lotion for the mouth. During the month of April, the patient took pills of chloride of zinc, extract of hemlock, and extract of carduus, without, however, producing any abatement or diminution of the symptoms.

Already in the course of February several teeth had become loose, and had been taken away by the patient herself. The swelling of the cheek and the gum continued increasing and was hitherto confined to the opposite left half of the face, where it quickly spread to the region of the first molar tooth. The fever assumed imperceptibly the character of hectic; the appetite was entirely gone; night-sweats wasted the strength of the patient, who was visibly emaciated; menstruation was suspended; and only the thoracic organs remained free from any disorder during the whole course of the disease.

The patient soon made up her mind to the operation; and on the 27th of June, the right half of the lower jaw was taken out at the articulation.

In this operation it happened, that as during the sawing of the bone, the periosteum was cut through, the finger slipped off, and thereby the periosteum of the residual half of the lower jaw was about one inch stripped off backwards. The periosteum itself was found much loosened, shreddy, vascular, hypertrophied. The rest of the soft parts abounded in fat.

Fourteen days after the date of the operation, while the healing of the wound was advancing, the part of the left side of the lower jaw which had been stripped of periosteum, began to project between the soft parts, without being at any point covered over by granulation; and this remained in this state till the summer of 1846, when the *sequestrum* was first separated, after that one part of it which irritated the tongue had been cut off by the bone nippers in the month of February. So long as the sequestrum was not separated, there was left in the skin a fistulous opening which speedily closed after the removal of the dead bone. Subsequently even there was removed a flat splinter of bone the size of a melon-kernel.

Description of the half of the Jaw which was removed.

This piece is sawn through between the second incisor tooth and the canine tooth of the left side, and hence the chin has been completely taken away. At the inner surface we perceive from the place, where it is sawn through to the alveolus of the fourth tooth, the periosteum separated by maceration and drawn backward. Close below it, appears the newly-formed bone, which extends in a semicircular manner from the alveolar margin towards the lower margin of the lower jaw, and again ascends on the outer side round the same. This new formation is, at the alveolar margin, an extremely slender and thin lamella of bone, and becomes thicker as it descends. Under the magnifying lens it presents a smooth aspect, and with fewer vascular orifices than the new formation, which is deposited on the ramus. It is nowhere connected with the subjacent bone, but merely deposited upon it; and the observer can easily separate it from the bone, which below appears completely normal.

In this specimen the periosteum is to a large extent preserved. From the spot where it is applied, it covers the subjacent newly-formed bone as far as the region of the last molar tooth *alveolus.* From the alveolar margin, at which it still surrounds the openings of the six nearest *alveoli,* it extends over the whole breadth of the lower jaw, and is continued even upon the outer side of the jaw, while it also here covers the newly-formed deposit. Only few vascular orifices open in this place, and these are mostly in clusters. In individual spots only where the periosteum is either most attenuated, or entirely destroyed, the part of the New Formation shows the worm-eaten appearance, as we shall afterwards see it in other parts. In the region of the last molar tooth, and towards the lower margin of the lower jaw, this part of the New Formation runs out in a point, which above is connected with the New Formation, covering the coronoid process. At this place it shews a scaly appearance, and at the same point the New Formation is nearly one-fourth of an inch removed from the subjacent bone.

The New Formation on the outer surface of the bone, in like manner covered by periosteum, is carried round the lower margin of the lower jaw, yet not touching it, and on the outer surface passes in a sharply-defined thick mass of newly-formed bone, which extends from the right incisor tooth to the third molar tooth, and from the edges of which, remains of periosteum are continued to the bone itself.

The rest of the newly-formed matter surrounds the inner and outer surfaces of the articular and the coronoid processes; this is merely deposited upon the bone, and has so little connection with it, that any one may move it hither and thither, and it might with little trouble be made to break off.

On the inside of the process on both sides of the *foramen menti internum* and the groove for the mylohyoid nerve, the new formation forms a very granuled, worm-eaten, pumice-stone-like mass, and rests in moderate thickness upon the bone, while it rises in an undulating manner towards the *foramen menti internum.*

The jaw-bone itself is sound. It nevertheless shews some deviations from the normal state, in so far as at its outer surface, between the New Formation, two spots of grayish colouring are seen, and here the cortical or compact bone appears reddish coloured. Further the alveolar process of the *alveolus* of the fourth molar tooth is carious. The teeth are entirely gone except one incisor tooth, which is sound. The alveoli of the other incisor, as also of the canine tooth, are still invested by periosteum. Those of the incisor teeth shew a greater number of vascular orifices than in the normal state.

The preparation is in the possession of Professor Dietz.

CASE THIRTEENTH. (16th of Von Bibra and Geist.)—Rosina Meier, twenty-four years of age, of middle size, fair, rather feeble, yet without scrofulous symptoms, and without phthisical disposition, very sensitive, was engaged for about five years working at a phosphorous-match manufactory. She was constantly occupied in the duty of numbering and packing the matches, and carried on this work in the same chamber in which the matches were dipped and dried. Subsequently the numbering room was separated from the drying room.

In November 1845 she left the manufactory and went as a domestic servant to Augsburg, where she remained six months. Towards the close of this period, she frequently suffered from toothach. She returned to Nürnberg and again entered the lucifer-match manufactory with swelling of the face already established; and continued in her former occupation for eight weeks. Fourteen days before her admission into the hospital; she was noticed by the Royal Medical Police Physician. During the time specified she was treated by antiphlogistic measures, the application of leeches, laxatives, scarification of the swelled gum, inunction of mercurial ointment; until, finally on the 22d June 1846, she entered the hospital.

At her admission there was found on the angle of the right lower jaw, a pretty considerable hard swelling of the cheek. The teeth on this side were greatly spoiled, hollow; and those on the left side useless. Whether they were loose could not be accurately ascertained, in consequence of the small extent of opening which the mouth admitted, from the difficulty of moving the lower jaw. Upon pressing the swelling a bad-smelling purulent matter was uniformly discharged from it. The upper jaw was also affected though in a slighter degree. The pain was intermitting, pungent, shooting.

This patient was subjected to the use of many remedies, general and local. Among the former were aperients, tartar emetic solution, nitrate of potass, and local bleeding by means of leeches; among the latter, lotions for the mouth, inunction of mercurial ointment, and mercurial plasters.

On the 3d of July three teeth were extracted and were found carious. On the 5th of July, as the tumour was fluctuating it was opened by incision, and good-looking purulent matter was discharged. After this the pain was much abated, and the swelling also diminished. On the 9th July, by the probe, a piece of loose bone was found at the outer alveolar margin in the region of the third molar tooth; and on the 11th this was removed by forceps. Pain however returned; and leeches were applied to the margin of the jaw. On the 14th of July calomel was ordered; and on the 15th traces of salivation were perceptible. On the 16th cathartics were ordered; on the 18th irritation to the head, assafœtida and phosphoric acid.

On the 21st July, the pains had again affected the right side of the face, and leeches were again applied, and mercurial ointment rubbed over the swollen parts.

On the 23d, notwithstanding all this activity of practice, the pains increased in the evening to an intolerable degree. The patient screamed aloud, moaned, and sprung from her bed. Acetate of morphia was given with the effect of procuring some hours of quiet sleep. On the 25th, there was, during the night, copious perspiration, sound sleep, and diminution of pain.

On the 26th July, the bone appeared to be much extruded. Nitrate of ammonia, acetate of morphia, and the arsenical solution of Fowler were ordered. As, however, there were, on the 2d of August, weight at the epigastric region, discomfort, irritating pains in the temporal region, and a restless night, this last medicine was stopped, and the following day the gastric symptoms had gone.

On the 4th of August, pain in the margin of the lower jaw had returned, and there was indistinct fluctuation. An emollient poultice was applied, and hydriodate of potass was ordered to be given.

On the 8th of August, the incision formerly made in the cheek had re-opened spontaneously, and given issue to some purulent matter. The probe, however, did not penetrate to any depth.

On the 13th of August, the symptoms were, difficulty in swallowing, pain in the lower jaw, and towards the larynx. A mixture of tartar-emetic and nitre was directed to be given every second hour, and eight leeches were applied.

On the 17th of August, some amendment had taken place; on the 19th, the muriate of baryta was ordered; on the 20th, as there was great pain below the chin, eight leeches were applied. On the 23d, hydriodate of potass was ordered; and, on the 24th, as the pain was great, a poultice with fifteen minims of laudanum was applied.

On the 26th of August, the cheek was again greatly swelled, and pain was violent and irritating. On the 29th the pain was severe during the day, but rendered tolerable during the night by means of opium.

On the 31st of August, in consequence of the violent pain, particularly on and below the chin, the difficult deglutition, and the hard swelling, though there was a tendency to the formation of matter below the chin, four leeches were applied, and afterwards a poultice.

On the 1st of September, nothing but fluids could be swallowed, and constipation was considerable. A dose of Glauber's salts was ordered.

On the 2d of September, the swelling was very considerable, hard, prominent, tense, painful, in no part shewing fluctuation, and embracing the right lower jaw and the region of the neck. Deglutition was most difficult; the mouth could not be opened; tough mucus was accumulated in the mouth and throat, but respiration was not impeded. In the afternoon, the patient expectorated a good deal of matter, and felt greatly relieved. The swelling was manifestly softer. Towards evening, the pain was increased. The opiate poultice was continued.

On the 4th of September, there was observed, a little below the right *ramus* of the lower jaw, a fluctuating spot the size of a groschen piece. Pressure on this point caused the discharge of matter from the mouth. The swelling was down; the pain was abating and remitting; and deglutition was more easily performed.

On the 5th of September, externally, at the anterior third of the lower jaw, and at its lower margin, a small abscess had burst, and discharged much purulent matter. The probe went backwards, in a direction parallel with the margin of the lower jaw. The opening was dilated in the direction of the lower jaw. The finger did not touch denuded bone, but only soft parts, which, nevertheless, gave a hard, unyielding sensation.

Between the 7th and the 12th of September, the pain was less severe; deglutition was more easily performed; and much purulent matter escaped from the opening. The mixture of antimony and nitre was continued.

On the 14th of September, farther back, under the angle of the lower jaw, was formed a second abscess, which was opened by incision. The probe proceeded from the opening of the anterior abscess into the cavity of the mouth.

On the 20th of October, the patient was attacked by rose, which, in the evening, had affected the whole right cheek and the nose with its characteristic redness, while blisters were beginning to be formed. Fever was intense. Chlorine water internally was ordered. On the 21st, though the night had been spent tolerably, fever continued, and the rose had affected the left side of the face. On the 22d, while fever was still great, the rose had extended over the whole face, and also on the scalp.

On the 24th, desquamation began, and, on the 25th, the cutaneous inflammation was gone.

On the 11th of November, pain was acute in the right cheek, which was much swollen. The probe entered between the first and second molar teeth of the upper jaw, and at this part struck on the denuded bone. Suppuration was considerable, and the fistulous openings in the cheek had become enlarged.

It was now explained to the patient that, without having recourse to surgical operation, the cure of her disease could not be expected to take place, and that, on the other hand, she would gradually slip into hectic fever. She therefore gave her consent to the resection of the diseased half of the jaw, which was accordingly performed on the 26th of November 1846, by Dr Von Dietz, in the presence of Dr Von Jahn, Dr Ziehl, Dr Geist, Dr Zehler, and Dr Barthelmess.

The state of parts at this time was the following.

The right cheek was protruded by a solid colourless swelling, which extended from the zygomatic arch to the right angle of the mouth, and over the region of the lower jaw. In the space which bounds on one side the anterior edge of the masseter muscle, on the other side the posterior edge of the *depressor anguli oris*, and, inferiorly, the lower margin of the lower jaw, were three fistulous openings, which were distant from each other about half an inch. The surrounding parts were reddened; the openings occupied by small luxuriant granulations. Through the lower fistulous opening, the probe went only a short distance; through the middle one it could be carried two inches obliquely upward toward the articulation of the lower jaw; the uppermost fistula led directly into the cavity of the mouth. From the existence of these openings, the author thinks it is to be inferred that the bone was either denuded, or at least diseased.

The incisor teeth, with the right lower canine tooth, were perfectly good; the gum was firmly fixed on them, not swelled; the teeth even were firm in their sockets. In the place of the right last molar tooth was a tooth hole empty. The swelling of the jaw extended at least to its lower edge, and over the body of the bone from the right angle to the region of the second right incisor tooth. From the cavity of the mouth, the probe went into the sockets of the extracted molar teeth, but not farther. Around these sockets the gum was swollen, loosened, and between it and the margin of the sockets, sanious purulent matter oozed out.

In the upper jaw of the corresponding side, from the right upper canine tooth backwards, the gum appeared in the same state with similar secretion of sanious purulent matter. The tongue could be protruded from the mouth only to half its extent; and the lower jaw-bone was in the joint pretty freely moveable.

The pains were latterly alternating in character. The general strength, sleep, and appetite, were good. Little fever was remarked, and there was no reason to suspect affection of the thoracic organs.

The right half of the lower jaw was removed as stated, at the articulation. In the region of the chin, the bone was cut through by the chain-saw in an oblique direction from the third molar tooth, close before the *foramen menti anterius*. Only two vessels required ligature—the *A. maxillaris externa*, and a small lateral branch of the temporal artery.

The result of this case is not stated.

The removed half of the jaw-bone exhibited the same marks of disease as in the other instances. Between the external and the internal oblique lines, both on the outer and the inner surface, it was covered with new formation, and was discoloured, grayish, and blackish. At the spot first mentioned, and on the inner surface, in the region of the fourth molar tooth, and under each of the specified large *foramina*, it was carious, and the outer plate was destroyed. The alveolar process was most covered with marks of disease, as vascular orifices. The substance of the bone itself is stated to have not hitherto been attacked.

The preparation is preserved in the General Hospital.

CASE FOURTEENTH. (18th of Von Bibra and Geist.)[1]—Susannah Huck, aged nineteen years, of middle size, slender, feeble structure of body, brown hair, white skin, who had never suffered under scrofulous eruptions or glandular swellings. In her tenth year, in consequence of being frightened and chilled, she fell into a state of convulsions, with a slight degree of chorea, which lasted for the space of twelve months. She was frequently attacked by violent thoracic catarrh, and occasionally suffered from œdema of the feet. In her eighteenth year she was confined to child-bed, after which she was much debilitated, yet remained in comparative health. In the lucifer-match manufactory she had been working for six years, and was occupied in the process of dipping and numbering the matches. With teeth partially spoiled, she suffered greatly during this time from toothach without swelling of the cheek, and for this she often employed sharp tooth tinctures. These toothach pains, meanwhile, were at all times continuous. Successively, several teeth were extracted, until at length the gum and the cheek began to swell. At the close of the winter of 1842–43, the swelling of the left cheek burst externally. But it was not till July 1843 that the patient applied for medical assistance.

On the 26th of July 1843, the partial Resection of the left half of the jaw was performed; and the bone anterior to the right canine tooth, behind to the last molar tooth on the left side, was sawn through, leaving, however, the articular and the coronoid process.

The external wound healed up pretty naturally; but two fistulous openings were left. After the lapse of some weeks, the surgeon remarked a continued secretion of purulent matter in the cavity of the mouth, and externally, and the remaining portions of the lower jaw, with the incumbent soft parts, appeared to have anew become swollen.

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[1] From some inaccuracy in numbering, there is no 17th case, and case 18th is made to follow case 16th.

The fever, which after the operation had in a great degree abated, became aggravated once more; chronic cough, with purulent expectoration and the other symptoms of pulmonary consumption became manifest. On the 22d of April 1844, the left articular and coronoid process, which had become quite loose, were removed by the forceps without difficulty. In the night of the 24th, some bleeding had taken place from the diseased parts; and on the 25th of April 1844, death took place in consequence of the phthisical symptoms.

The right half of the lower jaw was taken away after death.

The lungs were found hepatized, and occupied with tubercles, partly crude, partly softened.

Description of the Lower Jaw.

The right half of the lower jaw was so separated from the left, that the section passed midway through the socket of the left canine tooth. Only the last molar tooth is retained in a perfectly sound state in its socket; but it may be easily taken away. The socket of the third molar tooth is closed; the other teeth are gone. Altogether the *alveoli* are sound, and shew normal bony texture; and only in the fourth is remarked a great number of vascular orifices. The alveolar portion, which on the outside as well as within, is uncovered by new formation, is perfectly normal, in no place carious or furnished with an unusual number of vascular orifices; and the same is the aspect of the cut surface of the bone, at the place where it is separated from the left half of the jaw, both in shape and texture of the substance of the bone itself; the medullary cavity, and the interior of the alveolus of the canine tooth, are completely normal.

The outer surface of this half of the lower jaw-bone, the coronoid and articular processes are covered by a thick layer of newly-formed matter. This is on the processes mentioned thin and slender, thicker on the angle of the lower jaw, thickest in the middle of the body and on the lower margin. It covers the parts mentioned uniformly. The upper part of the New Formation, which extends over the whole breadth of the process and to the body of the lower jaw, forms a thin layer, which rests upon one more coarse lying below it, and which is in immediate connection with that covering the body of the bone. The colour of this New Formation is at the upper of a dirty green; that resting on the body of the bone is partly a dirty brownish-yellow, partly gray-green. This new formation is, in general, loosely attached to the bone. Its thickness varies from half a line to nearly one-fourth of an inch.

Round the neck of the articular process upon the semilunar notch, and on the coronoid process, is deposited another layer of New Formation, which begins exactly round the edge of the articular layer of the articular process, leaving the process unoccupied, surrounds the neck of the process, covers the semilunar notch and the coronoid process, but leaves its apex unoccupied.

Wherever the bone is not covered by New Formation, it is quite normal in shape, colour, and structure.

It is unnecessary to describe the part taken away by operation during life, which presented the usual characters of diseased bone.

The portion taken away before death presented several changes. New Formation covered both the processes; coronoid and coracoid; leaving the articular surface and process free. At the outer side, it presented the pumice-stone appearance. But the bone itself, with its cancellated tissue, is stated to have been perfectly normal.

Case Fifteenth. (19th of Von Bibra and Geist.)—Margaret Klein, twenty-five years of age, of middle size, fair, well-formed, of strong constitution, never remarkably unwell, without marks of dyscrasia, menstruating easily. She had been working for three years in the manufactory, and was in the first half of her period of working occupied in numbering the matches; subsequently she was also occupied in the process of dipping, and in the drying room. During the work, she had constantly remained well, had been attacked neither by cough nor by toothach, though the molar teeth of the right half of the lower jaw were almost all carious. In the end of August 1845 she left the manufactory, and fourteen days afterwards she was suddenly attacked in the night with violent swelling in the right cheek, especially in the region of the chin, with swelling of the gum; and this was quickly followed by the formation of abscess, which opened spontaneously and discharged matter. Under the use of homœopathic remedies, the swelling of the cheek was not dispersed, but rather became more violent, extended over the neck, was hard and very painful; the swelling of the gum was in no degree diminished, but inflammation increased; and in this stage of the commencing disease, the patient during the meeting of scientific persons, held at Nürnberg, was presented in the Section of Medicine and Surgery.

On the 27th of September 1845 she was admitted into the hospital. The treatment was antiphlogistic, with the use of iodine. To the 14th of October a small fragment of bone exfoliated from the alveolar arch. The swelling of the cheek and of the gum was considerable, but with little pain. In the region of the lower jaw an abscess had been formed, had burst and had discharged a small quantity of thick purulent matter. Behind was left a fistula, which constantly secreted purulent matter. During the second half of the month of October, the swelling of the cheek quickly became prominent, shining, tense, especially towards the region of the ear and downward on the neck. Deglutition was rendered very difficult; the opening of the mouth and the action of the jaw almost impracticable. Soon, however, these symptoms were abated. At the fistulous opening arose a considerable growth of granulations; the edges of these were loose and pendulous, and were removed by scissors. Accessions of pain alternated with periods in which it was absent; constipation alternated with diarrhœa; menstruation ceased.

The treatment consisted in the application of poultices, and the internal use of iodine, opium, and senna.

During the whole of the month of November the swelling of the cheek again increased; and the patient laboured under great anxiety. Inability to expectorate mucus, though without difficult breathing, deglutition very much impeded, the lower jaw scarcely moveable, great pain in the throat, were the leading symptoms.

Purified sal ammoniac with tartrate of antimony were prescribed.

This was followed by vomiting of bilious mucous matter, general warm perspiration, and alleviation of the symptoms.

At the lower jaw, two inches anterior to the first fistulous opening, after phlegmonous inflammation of the skin, a second abscess was formed. This opened spontaneously and discharged much purulent matter. It left a fistulous opening.

The decoction of Zittmann and cod-liver oil were prescribed.

Through the whole of the month of December, the pains were concentrated on the chin, while all the incisor teeth became loose and dropped out. Gastric symptoms appeared; great increase in the swelling, hemicranial headach, diarrhœa.

In January the condition of the patient was comparatively endurable.

In February renewed aggravation of all the symptoms took place; great severity of pain, particularly in the chin, where the extension of the new formation of bone could be distinctly felt. Fluctuation was perceptible below the skin. An abscess burst, and gave rise to a third fistulous opening.

In March all the symptoms ceased. The patient recovered appetite, menstruation was re-established, the strength was increased.

This amendment continued during the month of April. The patient, resisting any operating procedure, left the hospital on the 3d of May.

On the 2d of December 1846, fifteen months after the commencement of the disease, the author saw the patient. She was then in good health and strength, and affirmed that she was able to perform the most severe labours. The respiration was unaffected, the intestinal functions regular, the appetite good; there was no fever. Menstruation had been suspended for six months.

The complexion of the patient was pale, earthy. Both cheeks were, in their lower halves, considerably swollen, firm, tense. In the direction of the margin of the lower jaw, on the right side, there were on the region of the angle of the lower jaw, and two inches further forwards, two fistulous openings, which secreted but little matter. They were not prominent, but formerly were deep. On the left side, in the middle of the lower jaw, one inch below its edge, was a third fistulous opening, and a fourth, one inch below this, and farther back. The last opening, which had been formed a short time before, was situate in the midst of a hard elevation the size of a thaler; it was painful, and discharged phlegmonous matter in drops. The probe went through this and through the third opening, down to the bone, which was felt rough, and stripped of soft parts.

The mouth could be opened only to a small degree, the lower lip was pressed outwards, and there was seen here a bit of nekrosed bone projecting in the fissure of the mouth. When the patient opened her mouth as wide as she was able, and the lips were separated from each other as much as possible, the observer beheld the whole right half of the lower jaw denuded of all its soft coverings, completely toothless, projecting within the cavity of the mouth. It was completely separated from the left half at the chin, and here rising above it. It was quite free from pain, and the articular connection only sometimes excited pains.

When the operator seized this half of the jaw at the mental portion with a pair of strong forceps, he was able to thrust it, with the simultaneous occurrence of a grating sound in all directions, draw it forward, raise it upward; and he became convinced that the articular connection and the tendons of the temporal muscle were the only obstacles to its entire removal. This half of the jaw shewed, so far as it lay exposed, no New Formation. The bone was of a dirty green-gray colour, extremely offensive in smell; the *alveoli* carious in many points, and with a gray sanious matter, which also surrounded the outside of the bone. They were here also sharp-cornered, very uneven, and irritated the tongue and mucous membrane of the cheek. There was, however, no salivation.

The gum had been, as usual, entirely drawn backwards; and when the surgeon raised the lower jaw, he saw that this, with its lower free margin, lay in a trough-shaped excavated bed of soft parts, with smooth surface, which projected at its outer and inner side in an irregular manner, sometimes broad, sometimes tapering like the uvula. It was manifest that no long time would pass, when this half of the jaw might be removed. This depends only on the complete destruction of the articular connection and the tendon of the temporal muscle.

The left half of the jaw was at this time still firm in the soft parts. So far as the limited opening of the mouth, and the almost total immobility of this half of the jaw, permit a glance, this was in no part divested of its soft coverings. The gum appeared even to have overgrown with granulations the sockets left empty of the teeth, which had formerly come out. When the surgeon traced externally the direction of the lower jaw, he felt it to be thick, as if swelled; and there could be no doubt that it was covered by newly-formed bone. This left half consequently was, at this date, in an earlier stage of the disease than the right half, with which the latter commencement of the disease is in perfect correspondence.

On the 10th of December, says Dr Geist, I unexpectedly received the right half of the jaw.

The patient, he continues, encouraged by the attempts made by him to bring away the left half of the jaw, had, throughout the night preceding the 10th of December, repeated this manœuvre, and had so far drawn out the jaw-bone, that it could not again be replaced in its position in the cavity of the mouth. In this condition with the portion of jaw-bone protruded from the mouth, she betook herself the following day to the morning visit at the General Hospital. There attempts at extraction were made at first with the hand; but as these were unavailing, an attempt was also made to break off the portion of jaw hy means of the bone-nippers. This was also inadequate. By means of the chain-saw, the operator then endeavoured to remove only the anterior half which was protruded from the mouth; but from this he desisted, when he remarked that the jaw, from the violent action connected with the working of the saw, had become loose in the joint. He now succeeded in extracting it entire with the fingers; and this specimen, of great importance in illustrating the nature of the third stage of the disease, presented the following peculiarities.

The portion thus removed was the right half of the jaw-bone, as far as the region of the incisor teeth of the left side. It is completely toothless. The apex of the coronoid process is broken of, probably in consequence of the attempts made to extract the bone. The outer half of the surface of the articular process is preserved; the inner is as if impressed and covered by a clot of blood. The sharp edge of the sigmoid or semilunar notch in its deepest excavation, as also a portion the size of a bean, on the sharp edge of the articular process, and a similar sized fragment at the outer surface of the external oblique line, the whole of the internal oblique line, and a portion the size of a pea on the angle of the lower jaw, present their superficial bony *laminæ* destroyed, yet without having the carious or gnawed aspect, as is still seen in the horizontal part of the lower jaw. Among the parts in best preservation, and with their structure least injured, are the outer surface of the articular and coronoid processes, as far as the region of the angle, and the lower edge of the horizontal part of the jaw-bone. All the rest of the jaw-bone, and especially the alveolar arch with the *alveoli* present the carious aspect in the highest degree. The alveolar arch is almost entirely absorbed in the region of the first molar tooth, as far as the *foramen menti externum.* It is of a dirty grayish-green colour, quite soaked with uniformly-coloured sanies, presents most irregular worm-eaten edges; and the same appearance is exhibited by the *alveoli,* which are for the most part destroyed to their basis, and which form irregularly small and large cavities, in which are contained mucous and sanious matter. In the region of the last molar tooth, and downward to the angle of the jaw, the bone continues to be of a dirty greenish colour, which gradually disappears, proceeding from a settled, and at the same time elevated middle point in all directions. This part presents the remains of New Formation, which is taken in a process of loosening and solution. One large portion of New Formation, in thin layers viewed from above, in a thicker viewed from below, and worm-eaten in manifold points at its edges, softened, entirely soaked with sanious matter, and of a dirty red-brown colour, is situate behind and above the part.

The inner surface of the lower jaw presents an appearance still more carious if possible than the outer. Here, not only is the alveolar arch, but also the base of the bone from the incisor teeth to the region of the second and third molar teeth, in the highest degree carious, and the alveolar arch almost entirely absorbed. The whole bone presents in this place a dirty gray-green colouring; its tissue is loosened and penetrated with sanious matter. One large portion of New Formation, worm-eaten, more soft, and still more infiltrated with sanious matter, is placed here on the angle of the lower jaw, and a second smaller above the first, outside and below the *foramen menti internum.* The intermediate space between these two shews the bone in the condition described. There can be no doubt that this intervening space had been also covered by New Formation, which had been removed by absorption.

The preparation exhaled a most offensive odour.

An account of the preparation when dried follows. But this it is unnecessary to give. The only important part is the following.

The New Formation in the dried state shews the usual mossy-like aspect, and has retained its reddish colouring. This colouring marks the jaw-bone, so far as it was covered by New Formation, and this presents at the same time the last remains of the New Formation, as it penetrates near to the substance of the bone itself. The author separated it from the subjacent bone in several places, and beneath he found the bone of its natural white-yellow colour and lustre. In these spots of the bone, further, which along with the green colouring shew also vascular orifices, as proof of the already-established crumbling of the texture, the colouring also penetrates into its substance.

Some days after the half of the jaw-bone now described had been removed, the patient presented herself to Dr Geist, and he found the following state of parts.

When he traced externally the direction of the lower jaw, he found, along the whole of its course, a firm horizontal margin of the jaw, with distinct incurvation from above in the region of the angle of the lower jaw. This sensation was so distinct that, did he not know, that at this place the half of the lower jaw was entirely gone, he could not have conjectured that it was lost. The lower jaw accordingly appears to be completely restored. This half of the face has thus quite its natural appearance, except that it is smaller than the left, in which the other diseased half of the jaw still remains. Only in the region of the angle of the lower jaw there is a contracted cicatrix, which draws with it the adjoining parts of the skin, and thereby induces some deformity.

When he examined the place of the jaw by the cavity of the mouth, the gum of the left half of the lower jaw, which forms round it a cylindrical swelling, passes immediately into those soft parts, which were above mentioned, in such a manner that the denuded half of the jaw rests upon them. They present a well-organized gum, which in no respect differs from a sound gum. It is perfectly smooth and even, and is continued backwards without interruption. It is lower than that of the left side; and it is possible to allow the finger to glide backward upon it, so little sensitive is it, and so firm does it feel. This shews that the inference, that the last half of the jaw-bone has been restored, is well founded.

It will be interesting, he adds, to observe the further progress of the disease in the left half of the jaw. The author expresses the opinion that it can be nothing else than that which is now described.

Supplementary to the case now recorded were the observations madé by Neumann, at Berlin, in the Clinical Establishment under Dr Wagner, in this respect, that they not less shew us the termination of the disease in cure, after the spontaneous separation of one half of the jaw-bone. These observations, indeed, are less fully described, and appear further to be presented only in the last stage of the progress of the disease, as Neumann nowhere mentions the circumstance of New Formation of Bone, which in Nürnberg and Vienna has been uniformly observed. They are nevertheless perfectly entitled to be regarded as the last member of that circle of facts, within which we may contemplate in all directions the symptoms and the course of the disease in the lower jaw, and may thus sketch a complete delineation of the disease.

CASE SIXTEENTH. (20th of Von Bibra and Geist.)—Elizabeth P., aged nineteen years, of pretty strong constitution, had since the twelfth year of her life worked in a lucifer-match manufactory, and had been particularly occupied in the sulphuring part. In the first period of her service she suffered an inflammatory attack in the chest, but afterwards recovered perfectly. About one year previous to the date of her illness, toothach pains took place in the left lower jaw, and an ulcer was formed in the gum in the region of the third molar tooth, which she allowed to be extracted. From the ulcer there came at first a small splinter of bone, and four days afterwards a large fragment of bone. The cheek now swelled and became reddened; and in the mouth was formed an abscess, which discharged much purulent matter. In consequence of many necessary incisions, the cheek, with the gum, diminished; several abscesses, however, were formed in the cheek, on which account, for the alleviation of the discharge of matter, an incision through the external skin was made.

Under the use of poultices six pieces of bone came away. New abscesses continued to be formed; the teeth of the lower jaw became loose; and seven of these the patient herself took away. After some time an abscess was formed on the articulation of the jaw-bone. The denudation of the bone of its soft parts, which was always on the increase, at length gave occasion to the operation of resection of the lower jaw. The portion of the lower jaw which was left behind separated spontaneously in a short time afterwards. Cicatrization and cure then ensued.

CASE SEVENTEENTH. (21st of Von Bibra and Geist.)—Caroline P., twenty-seven years of age, always in good health, occupied for the space of twelve months in a lucifer-match manufactory, was attacked first with toothach in the right lower jaw, and soon afterwards in the left upper jaw. Several teeth were extracted; and the growth of spongy granulations arising from the opening of several abscesses was restrained by the repeated application of the glowing iron.

Another physician removed a portion of nekrosed upper jaw-bone. At length the patient applied at the Clinical Establishment of Wagner for assistance. The left upper jaw was found completely nekrosed; several teeth were loose. Cicatrization followed, with loss of a small portion of the upper jaw-bone. In no long time afterwards the right lower jaw was also attacked, and was killed and separated in its whole extent. Recovery then followed.

CASE EIGHTEENTH. (22d of Von Bibra and Geist.)—Emilia P., twenty-five years old, constantly healthy, had for the space of ten years been working in a phosphorous-match manufactory without injury to her health; and from her nineteenth year had been occupied in a phosphorous-match manufactory.

In September 1842 nekrosis began in the left lower jaw. In March 1843 she allowed herself to be taken into an hospital. Several teeth dropped out; abscesses were formed; fragments of bone came away; and lastly, in December the whole carious gray-coloured light portion of the lower jaw came off. Reparative healing now followed; yet after the lapse of six months the disease shewed its presence in the lower jaw of the right side also. Abscesses were formed, and discharged purulent matter for twelve months. Some bits of bone, however, only exfoliated. After this time the state of her health was no longer disordered.

CASE NINETEENTH. (23d of Von Bibra and Geist.)—Augusta R., twenty-five years old, a healthy and vigorous girl, worked for one year and a half in a lucifer-match manufactory. In June 1843 nekrosis began in the right side of the lower jaw under the form of toothach and swelling of the cheek, which extended deep down to the neck, and required the performance of several incisions. After the period of two years and two months, the whole of the right half of the lower jaw came away. The parts then healed.

CASE TWENTIETH (Appendix.)—By Dr Kolb of Stuttgardt.—An unmarried female, aged about thirty-three years, had been acting in a lucifer-match manufactory as overseer; but she had given up the situation already eighteen months before the disease broke out. Previously to entering the manufactory, she had already several spoiled teeth, frequently during work, suffered from toothach, and had allowed several teeth to be extracted. The actual outbreak of the disease was preceded by long-continued and violent pains in the teeth. These terminated after a space of four months with separation of a part of the mental division of the lower jaw, containing five *alveoli*, and two pieces of bone of the right lower jaw, one the size of a plum-stone, the other that of a hazel-nut. The disease had also, however, attacked the upper jaw on the left side, and appeared even about to extend to the frontal bone, as the region at the root of the nose began to be affected with swelling. Dr Kolb now prescribed the tincture of Mezereon in doses of one drop, three times daily, and ordered cold applications upon the frontal region. The result of this treatment was so favourable, that after the lapse of two weeks the further progress of the disease was completely arrested, and after the period of one year and a half no further traces of the disease of the jaw appeared.

Dr Kolb remarks that, in the case of this patient, sugar acted most prejudicially, and also that opium even in the mild form of infusion of the poppy capsules, excited violent stitches in the exterior of the chest, the greatest degree of debility, icy coldness of the skin, faintness, and even convulsions.

Dr Kolb further remarked the occurrence of sharp corrosive eruptions on the head and ears, sometimes dry, sometimes moist, with which the patient continues to be attacked.

The piece of bone exfoliated in this case was the mental portion of the lower jaw in its entire thickness. The external lamella of bone had not yet been absorbed; but it presents an innumerable amount of holes not larger than pin-points, shewing, in the opinion of the author, that the process of absorption had commenced.

On the inside, the external lamella was entirely destroyed, and the bone had quite the same gnawed, worm-eaten appearance so often remarked. This appearance the author ascribes to the operation of the sanious matter, which he thinks destroys the texture of the bone, by its admission into the medullary canals.

New formation of bone was not observed in this specimen. But the author thinks that the dirty greenish colouring which the sequestrum presents at its outer surface, justifies the inference, that it had been covered by new formation.

We see in this instance, says Dr Geist, once more spoiled teeth performing a certain part in the production of this disease. The disease broke out eighteen months after the patient had left the manufactory; it had therefore a new onset for the period denominated by us *stadium invasionis*, so far as first with the commencement of reaction the essential characters of the disease appeared, and must have been originally protracted to the space of one year and a half. We further know, from the anatomical characters of the separated fragments of bone being perfectly similar, the identity of the disease in a degree still more certain than results from the history of the symptoms, and hence may justly conclude that in the foregoing case, not less originally New Formation of bone had been deposited, the subsequent destruction of which made the secretion of sanious matter have the effect of causing the destruction of the bony tissue, and the separation of the fragment of the lower jaw.

Well deserving of attention are the fretting eruptions on the head and ear of the patient, sometimes dry, sometimes moist, in so far as Von Bibra observed similar eruptions in his experiments upon animals. Whether this, however, is to be considered as an effect of the operation of phosphorus, or ought rather to be ascribed to some other cause, is not allowed us with certainty to say, either from the communication from Dr Kolb, or from the comparative facts hitherto recorded.

Dr Geist is of opinion that this case is not given in sufficient detail, and thinks that it would be important if Dr Kolb would give a full record of its circumstances, specially in reference to the apparent physiological effects of sugar and opium upon the patient. He suggests that idiosyncrasy, the hysterical disposition, and other circumstances, may have come into action, and produced the effects as noticed, probably as a peculiar action of sugar or of opium upon the morbid process. He allows, however, that it must not be overlooked that Lorinser remarked that narcotic remedies, even in large doses, effected but little alleviation in the sufferings of patients.

Six other cases, it was mentioned in last article, had occurred to the observation of Von Bibra and Geist. In four cases the lower jaw was the seat of the disease; and these had come under observation at the earliest period. In the two other cases, the disease had continued a long time in the upper jaw bone, and had extended itself to the contiguous bones. The total number of cases which had taken place in Nürnberg, up to March 1847, amounted to twenty-one.

Of the four cases, in which the lower jaw was the seat of the disease, in three it was found in the incipient stage; (*stadium invasionis*). The patients were three young females, Maria Maurermeier, aged nineteen; Agnes Bock, aged twenty; and Josepha Gleisner, aged nineteen years, in good health otherwise. They had for a long time been working at the lucifer-match manufactory, and they had spoiled teeth in the diseased side of the jaw. The symptoms were the usual well-known ones. Reaction had not at the date of the cases taken place, and no fever was present. Under the use of local bleeding, by means of leeches applied to the gums, lotions for the mouth, purgative remedies, and the subsequent extraction of the spoiled teeth, the progress of the disease was stopped.

CASE TWENTY-FOURTH.—This case, which was the fourth of these six cases, took place in the person of Kunigunda Weber, aged twenty-two years. The disease was already advanced to the stage of Reaction. Fever was established, suppuration was proceeding, the swelling of the gum was considerable, the jaw-bone was unequivocally covered with New Formation to moderate extent, the cheek was swelled and very painful. In the affected left half of the jaw there were also spoiled teeth.

The antiphlogistic treatment employed at the beginning was no longer capable of putting a stop to the progress of the malady, and as little did they observe any serviceable operation from the use of tincture of Mezereon.

The prognosis was in this case unfavourable, in so far as it could be expected to be stopped only by loss of a part of the lower jaw, either by operative measures, or by spontaneous separation. The patient was up to the date of the case in the hospital.

More important and of greater service in illustrating the etiology and the pathology of the disease of the lower jaw-bone, are the two following instances of the malady in the upper jaw-bone. They belong to the most severe forms that can take place ; and one of them terminated fatally.

CASE TWENTY-FIFTH.—Maria Gross, twenty-three years of age, of very large stature, but at the same time strong, muscular, menstruating regularly, in the constant enjoyment of good health, had been working for eighteen months in a lucifer-match manufactory, and was employed without intermission in the business of numbering the matches. Embellished with most beautiful teeth, she had only one spoiled tooth in the left upper jaw, when towards the end of the time of her working in the manufactory she was attacked by toothach, the seat of which appeared to be in this spoiled tooth. This took place about Christmas 1843. She left the manufactory, in order to take employment in a tobacco-manufactory, and continues till the present time in this occupation.

After the lapse of one entire year, during which she had never been obliged to interrupt her working, remained constantly well, and till the middle period of the development of the malady, in the upper jaw, had made no application for medical assistance, the patient presented, in January 1847, when seen by Dr Von Bibra and Dr Geist, the following condition.

When the observer closely examined the countenance of the patient, he observed the complexion to be completely healthy ; yet, at the same time, the shape of the nose was visibly abnormal. This organ shewed further widely-raised nostrils, the *alæ nasi* as if extruded and attenuated, the mucous membrane, in a state of chronic inflammation as if injected ; and upon the base of the left nostril, thick bad smelling matter is collected. This matter runs from the patient in quantities, especially in the morning. When the observer raised the upper lip, the alveolar arch of the left upper jaw was observed to be denuded of its covering to the extent of a half gulden piece, to be rough, of a dirty yellow-brown colour, and smelling badly. The gum was adherent at the dental edge, of a livid colour; and three or four small purulent ulcers were situate in it on the right and the left of the denuded portion of bone.

No tooth, however, had dropped out. The teeth, collectively, were sound, with the exception of one molar tooth in the upper jaw. Only a small quantity of purulent matter was here secreted. The four incisor teeth, the two canine teeth, and on the right and left side the adjoining molar teeth were loose, and about to come away. When the surgeon attempts to move the upper jaw, he first perceives correctly the extent of the disease; because from the first molar tooth on the right side, to the last on the left side, the alveolar arch is moveable, and no doubt can be entertained that to this extent the bone is detached. The soft palate is swelled, elastically tense, a little reddened. The organs of deglutition present nothing abnormal. For the period of half a year the disease has continued almost void of pain.

In this case an extensive destruction and separation not only of the alveolar arch, but also of the palate bone of the nasal muscles, and other parts may with certainty be apprehended to take place.

CASE TWENTY-SIXTH.—The other case which terminated fatally, took place in the person of Katharine Koget, aged twenty-three years. This young woman, of small stature, fair, feeble, nervous irritable constitution, had, for the space of two years, performed the duty of numbering and fixing the matches in a lucifer-match manufactory, yet without during all that time suffering under other symptoms than those of periodical toothach. Of these complaints spoiled teeth in the upper jaw were considered as the cause; and, consequently, the work was not interrupted. So long as the patient was occupied in the manufactory, the disease of the jaw-bone did not betray its presence; and even one complete year elapsed, after she had already entered another occupation, before reaction took place. At the commencement of this she was suffering under ringworm, and from the treatment of this she dated the commencement of the disease in the jaw. She was subjected for twelve months to homœopathic treatment, and on the 16th of February 1847 we received a report of her case.

Examination of the state of the disease at this time furnished the following results.

The young woman is emaciated, suffering under hectic fever. Great loss of strength obliges her to keep in bed almost the whole day. She suffers under violent periodical pain in the occipital and cervical regions; numbness, stiffness, and sense of formication in the fingers and arms, frequent fits of giddiness; the head is held rigid; its movements are accompanied with pain and difficulty, and it is the seat of great heat. The complexion is earthy. The right eye-ball is protruded, so that only with effort can the eyelids be made to shut over it. The power of vision is gone. The pupil is dilated, immovable; the conjunctiva, both ophthalmic and palpebral, is reddened and injected. At the outer angle of the eye is a fistulous opening, from which fetid purulent matter is constantly discharged, and runs over the cheek. Matter of the same kind proceeds from both nostrils, the mucous membrane of which is reddened and inflamed.

The alveolar arch of the upper jaw-bone, in which are several spoiled teeth, is upon the right side as upon the left, stripped of its soft coverings to the extent of a gulden piece, rough, of a dirty yellow-gray colour, and the gum, though still present, is perforated by many abscesses. The soft palate, the uvula and pharynx, are swelled. From the patient proceeds a loathsome smell which fills the whole chamber.

On the third of March 1847, when the patient was engaged in some trifling occupation, she became suddenly faint, and expired amidst convulsions.

Only with great difficulty was permission given to examine anatomically the interior of the head.

Upon dividing the soft parts, which were almost entirely void of blood, the vault of the cranium was found to be very thick. After removing the skull-cap, serum escaped; and the *pia mater* and arachnoid membrane were found opaque, and infiltrated with serous fluid. The *dura mater* of the anterior half of the right hemisphere of the brain was discoloured blue, softened, soaked in sanies, and thin fluid blood. The substance of the brain was, in like manner, discoloured, and enclosed an abscess almost as large as the egg of a goose, the purulent matter of which was gray in colour, thick, and of a very fetid odour. The rest of the substance of the brain was soft. The right optic nerve was atrophied. The choroid plexus was strongly developed. In all the cavities of the brain was contained watery exudation.

For the purpose of more accurately examining the bones, the inspector took away the external half of the right orbit, the malar bone (*os jugale*), and the large wing of the sphenoid bone. In all these bones New Formation of bony matter was deposited. Almost the whole orbit was covered with it; in like manner, the outer and inner surface of the zygomatic arch, its process, the outer surface of the pterygoid process of the sphenoid bone, and especially the cavity which is formed by the large wing of the sphenoid bone.

This New Formation was upon the bones of the orbit a thin deposit of greenish, moss-looking appearance. On the *os jugale* (malar bone), and on the large wing of the sphenoid bone, it was, for about the thickness of half a line, a homogeneous, extremely slender, uniform mass of dazzling white colour, in general exactly of the same character as was already mentioned in speaking of the articular and coronoid processes of the lower jaw of Susanna Huck, (Case Fourteenth.) The bones themselves were in by far the greater extent, perfectly sound; and only the *ala major* of the sphenoid bone appeared upon its lower surface connected with the maxillary bone, to be discoloured bluish, and shewed enlarged medullary canals; and the discoloration penetrated the whole substance of the bone, as upon the sawed surface it was distinctly beheld.

On the alveolar portion of the upper jaw-bone, the inspectors could observe no New Formation.

It is to be regretted, says Dr Geist, that we had it not in our power to carry away, examine, and preserve the portions of bone now described. Undoubtedly, in this case, the bones of the face, and part of the bones of the cranium, were more extensively covered with newly-formed matter.

It may be here added that it was from the last two cases, and in part also from that of Kunigunda Weber, that it was possible to procure a quantity of purulent matter sufficiently large to perform a perfect chemical analysis, and thus to obtain the results communicated in last Number at page 153.

[In the foregoing article are given the general semeiographical history and the most important details of the cases of lucifer-match makers' disease in the bones of the face, contained in the treatise of Drs Von Bibra and Geist. These cases have been given without comment or remark, except in one instance, in which, perhaps, some observations were necessary. In all other respects the most eligible course appeared to be to present the cases exactly as they are given by the authors, as an authentic selection of facts upon a disease,—the offspring of a recent and extensive branch of manufacturing industry.

These cases being varied and different, though not numerous, may be taken as presenting all the most important forms, in which the disease of the bones of the face is liable to appear. They are entitled to attention, likewise as containing ample and detailed accounts of the anatomico-pathological effects of the distemper; and supplying, therefore, a deficiency in its history. A faithful and accurate history of the facts is all that at present seems to be required. Readers, and the profession in general, will thus be enabled to form for themselves correct ideas, on the nature, the course, the symptoms, and the effects of this disease; and they will understand its tendency to cause in the bones of the upper and lower jaw those extensive ravages which have attracted so strongly the attention of surgeons.

In a subsequent number we shall study to give some further elucidations of this subject from the work of Drs Von Bibra and Geist.]

ART. V.—*Meteorological Observations at Charlotte Town, Prince Edward Island, in* 1850 *and* 1851. By THOMAS STRATTON, M.D., Edinburgh; Surgeon, Royal Navy.

Prince Edward Island, in the Gulf of St Lawrence, is not so well known in Britain as its merits, as an emigration field, deserve. It is rather out of the way of those travellers who steam across the Atlantic, and make a tour of a few months in British and Republican America. I think that a few notes respecting its temperature, &c., may be interesting to intending emigrants and their friends, and also to writers on climate in general, particularly as I observe that, in the admirable work of Dr Drake (*On the Principal Diseases of North America*, Cincinnati, Ohio, 1850), which contains an account of the climate of the valley of the St Lawrence, there is no allusion to the island. Charlotte Town, the capital, is in north latitude 46° 12′, and west longitude 63°; the town is from 10 to 50 feet above high-water level; a few houses are 50 feet, nearly half the town is about 30 feet, and the remainder is situate at an elevation above the sea, varying from 30 to about 10 feet.

		External Register Thermom.	External Thermometer, Fahr.			Barometer.		
		Lowest in the Night.	At 9 A.M.	At 3 P.M.	At 9 P.M.	At 9 A.M.	At 3 P.M.	At 9 P.M.
1850.								
Oct.	Min.	30°	38°	40°	34°	29·12	29·02	29·60
	Max.	56	65	66	58	30·05	30·11	30·12
	Mean of the two	43	51·5	53	46	29·58	29·56	29·56
	Range	26	27	26	24	0·93	1·09	1·12
Nov.	Min.	17	25	27	22	28·68	29·04	29·15
	Max.	43	52	58	48	30·08	30·16	30·14
	Mean	25	38·5	42·5	35	29·38	29·60	29·64
	Range	26	21	31	26	1·40	1·12	0·99
Dec.	Min.	*m* 5	1	5	*m* 3	29·11	29·22	29·24
	Max.	29	39	40	36	30·05	30·07	30·07
	Mean	12	20	22·5	16·5	29·58	29·64	29·60
	Range	34	38	35	39	0·84	0·85	0·83
1851.								
Jan.	Min.	*m* 27	*m*15	*m* 4	*m*10	29·10	28·99	28·70
	Max.	28	34	36	33	30·27	30·30	30·40
	Mean	0·5	9·5	16	10·5	29·68	29·49	29·55
	Range	55	49	40	43	1·07	1·31	1·70
Feb.	Min.	*m* 17	*m*10	*m* 6	*m* 5	29·10	29·02	29·02
	Max.	33	47	46	41	30·62	30·61	30·53
	Mean	8	18·5	20	18	29·56	29·21	29·77
	Range	50	58	52	46	1·52	1·59	1·51
March	Min.	*m* 17	8	14	zero.	29·11	29·20	29·20
	Max.	35	50	48	41	30·14	30·20	30·22
	Mean	9	29	31	20·5	29·62	29·70	29·71
	Range	52	42	34	41	1·03	1·00	1·02
April	Min.	20	21	24	24	28·99	28·90	28·94
	Max.	41	55	59	46	30·18	30·26	30·29
	Mean	30·5	38	41·5	35	29·58	29·58	29·61
	Range	21	34	35	22	1·19	1·36	1·35
May	Min.	24	41	42	34	29·37	29·24	29·17
	Max.	49	68	69	59	30·09	30·04	30·04
	Mean	36·5	54·5	55·5	55·5	29·73	29·64	29·60
	Range	25	27	27	25	0·72	0·80	0·87
June	Min.	34	43	44	39	29·48	29·46	29·46
	Max.	58	66	77	65	30·38	30·38	30·36
	Mean	46	54·5	60·5	52	29·93	29·92	20·91
	Range	24	23	33	26	0·90	0·92	0·90
July	Min.	47	54	55	52	29·51	29·53	29·53
	Max.	65	78	83	78	30·25	20·26	30·27
	Mean	56	66	74	65	29·88	29·79	29·90
	Range	18	24	28	26	0·74	0·73	0·74
August	Min.	44	53	58	48	29·72	29·72	29·66
	Max.	63	71	79	68	30·42	30·44	30·47
	Mean	53·5	62	68	58	30·07	30·08	30·06
	Range	19	18	21	20	0·70	0·72	0·81
Sept.	Min.	29	41	47	36	29·61	29·71	29·81
	Max.	64	72	82	72	30·44	30·44	30·43
	Mean	46·5	56·5	65	54	30·02	30·07	30·12
	Range	35	31	35	36	0·83	0·73	0·22

In December, my self-registering thermometer was below zero on seven nights, in January on seventeen nights; in February on six nights, and in March on six nights.

The particulars of the first eight months are from my own observations. Being absent from the island in summer, I have been favoured by my friend Mr Beazeley with the details for June, July, August, and September. On comparing my barometer (made by Casertelli) with Mr Beazeley's instrument (made by Weaber), I find that mine stands twenty-three hundredths of an inch lower than his. Mr Beazeley's barometric mean for the year 1851 is 29°·99, and the thermometric mean 41°·7.

	NUMBER OF DAYS							
	Fair.	Snow.	Rain.	Sleet.	Hail.	Lightning.	Fog.	Continuously fair.
1850.								
October .	17	2	14	0	0	1	1	4, 3, 2, 5.
November	17	4	7	2	3	0	1	9, 5.
December	18	8	4	0	1	0	0	5, 2, 5, 2.
1851.								
January	18	10	5	0	2	0	0	7, 4, 2, 2, 2, 2.
February	12	11	7	1	1	0	0	2, 3, 2, 2, 3, 3.
March .	14	13	7	2	1	0	0	2, 3, 5, 3, 2, 2.
April .	18	5	10	0	1	0	0	2, 3, 3, 8.
May . .	16	2	15	0	0	0	1	2, 2, 2, 2, 4.

In *June*, days fair, 15; rain, 15.
July, days fair, 15; rain, 16.
August, days fair, 21; rain, 10.
September, days fair, 20; rain, 10.

In 1851, there were 190 fair days, and 175 days of snow or rain. The navigation closed on the 19th of December 1850, and opened on the 13th of April 1851, which I was told was earlier than it had been for twenty years, or since 1831.

The number of days on which lightning was observed, in the year 1851, was, in June, none; July, four; August, one; September, none.

To degrees below zero I have prefixed *m*, as a printer is apt to mistake the *linear* sign for a mere stroke of the pen. In the *Edin. Med. and Surg. Journal* for January and July 1844, I have shewn that the source of typographic error might be conveniently avoided by using a scale which should commence at minus 40° Fahr.; be 40° at Fahr.'s zero; 72° at Fahr.'s 32°; and 252° at 212° of Fahrenheit.

In winter the ice in the harbour of Charlotte Town is so thick that loaded sleighs cross it in all directions.

ART. VI.—*An Account of the last Illness of the late Honourable Daniel Webster, Secretary of State to the Government of the United States. With a Description of the post-mortem Appearances, &c.* By JOHN JEFFRIES, M.D.[1] (American Journal of Medical Sciences, Volume Forty-ninth, p. 110. Jan. 1853.)

MR WEBSTER was of a sanguineo-bilious temperament, of a swarthy complexion, with straight black hair, with a large, athletic, and well-proportioned frame. He was five feet ten inches in height, and when in health weighed one hundred and ninety pounds. His appearance was peculiarly imposing, and the expression of his features, more particularly of his eye, was perhaps more powerful than that of any other man. He was nearly seventy-one years of age at the time of his death.

Mr Webster, although endowed with an iron constitution, had been subject *for the past eighteen or twenty years to an habitual diarrhœa,* which, commencing as an occasional looseness, had gradually increased upon him, until for the last three years, it was persistent. For this, he was accustomed latterly to use opiates generally in the form of a "cholera medicine," which appeared to be composed of sulphate of morphia and the compound spirits of sulphuric ether.

For about the same number of years he had been annually subject to a somewhat severe form of catarrh, commencing from the 6th to the 16th of August, and continuing until about the 1st of October. The only exception to the occurrence of this was in 1839, when he was in Europe. He was sometimes confined by this for a short period, but usually continued his exercise and duties abroad. In the early years of this complaint he did but little for it; but latterly he had adopted energetic treatment under medical advice, in the hope of preventing the annual visitation.

In August 1851, while at Franklin, N. H., whither he had gone for retirement, hoping, by a change of climate, to escape his annual catarrh, he was attacked, after exposure to the damp ground, with gout in his feet, mostly in the great toes; he was so far relieved of this, however, as to take a journey to the White Mountains; but, on his return to Franklin, the gout returned in a more severe and general form.

On the 9th of September he came to Boston and placed himself under the writer's care. At this time his complexion was sallow, and he had lost considerable flesh; his eyes were red, and his countenance indicative of great uneasiness. His pulse was full, quick, and firm; his nights were distressing and restless; there was constant thirst; the bowels were irritable, and, although without appetite, he was taking food without restraint, and by advice using stimulating drinks freely. He was also taking iodide of iron with hydriodate of potass, and minute doses of oxide of arsenic as a preventive of the catarrh. He had also used some remedies for the gout, and frequently resorted to opiates for his diarrhœa. With some difficulty he was induced to relinquish all these medicines, to restrict himself to the simplest food, and to retire to Marshfield for recreation and exercise. In September he returned to Washington, expressing himself as being "perfectly well," having implicitly followed the directions given. During the winter of 1851 and 1852 he transacted a vast amount of business at the seat of government; being, however, frequently under medical treatment for his diarrhœa. He failed in flesh and strength towards the spring; and in the latter part of April went to Marshfield in hopes of recruiting.

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[1] The author is indebted to Dr S. Parkman for the arrangement of this paper from the notes read before the Suffolk District Medical Society.

On the 6th of May 1852 he was thrown from his waggon, falling forward upon his hands, and striking his head with much force upon the ground. He was for some time insensible, but soon recovered perfect consciousness. On the 20th he came to Boston, and was visited by Dr J. Mason Warren in consultation. He was found to have injured the joints of both wrists, the left more severely, without any apparent displacement or fracture; there was considerable swelling and great ecchymosis of the whole fore-arm, with frequent severe paroxysms of pain through the joint; there was also a slight flesh wound near the right temple. He made no complaint of uneasiness in the head. On the 24th May he addressed his fellow-citizens in Faneuil Hall, being then suffering under great general debility. In July, at the time of his public reception in Boston, he was suffering more than his usual from his diarrhœa, and was under medical treatment to enable him to go through the fatigues of that occasion.

On his return from Washington to Marshfield, in September, he took cold in Baltimore, and first complained of the symptoms connected with his final illness. On the 20th of September he drove from Marshfield to Boston, a distance of thirty miles, for medical advice.

It was then observed that he had lost much flesh, which gave to his large eye a somewhat unnatural prominence. His face was pale with a peculiar sallowness; but there was no jaundice at this or any other time. He rose from the recumbent posture slowly and with some apparent difficulty, and he had the aspect of a very sick man. He stated that he had been more than usually unwell for a week or more; he complained of uneasiness on the left side of the abdomen, with consequent difficulty of lying on that side; there was also sometimes a sense of tightness across the lower part of the abdomen. The bowels were still loose, but not quite so irritable; the appetite was wholly gone; the skin was commonly very dry, and there was a constant dryness of the tongue and fauces, with much thirst. The tongue was covered with a light brown coat; the pulse was 106, quite full, but easily compressed, somewhat jerking, with four intermissions in a minute. The urine was scanty, high-coloured, and very turbid after standing, not coagulating by heat. The abdomen was much distended and resonant from flatus at almost every part, but particularly at the arch of the colon; there was flatness in the hypogastric and iliac regions, and signs of dropsical effusion were thought to be perceived. The edge of the liver more distinctly felt than at any subsequent period, was firmer than natural, but without tenderness on pressure. Neither was there soreness at any part of the abdomen. The feet and legs were œdematous, considerably so about the ankles. There was some soreness of the soles, especially under the ball of the great toe. There was a similar soreness in the left thumb and wrist which had been most injured by the accident. He had also flying pains about his lower limbs and body, described as similar to those previously experienced from the gout. The usual course of action of the bowels was a dejection at 5 or 6 P.M.; another at 9, and a third at from 2 to 4 A.M.; these, especially the last, were urgent, loose, and with much flatus. After the morning dejection he took a portion of his usual "cholera medicine," which gave him relief.

He returned to Marshfield the next day, the 21st, with the following directions: To abstain from all mental labour, and to avoid fatigue in bodily exercise. The diet to be tea with bread and butter, morning and evening, and a little animal food at dinner, with one vegetable.

To take two drachms of castor-oil, and an equal quantity of lemon-juice, every second or third day, if troubled by distension, or if the bowels did not act easily. To take a cardiac mixture twice daily, and a pill of one grain of acetous extract of colchicum with two grains of camphor each night.

To have the abdomen gently rubbed, and a hot alkaline bath applied night and morning; the feet and legs, after being smeared with olive oil, to be rubbed with warm spirit twice daily.

On the 28th, 29th, and 30th he was visited at Marshfield, and was found with much the same symptoms, except that the abdomen was more tense and flat, and there was well-marked fluctuation, with some soreness of the left side, for which five leeches were applied with relief. The urine was a little less scanty and turbid. He had continued to come down stairs, and one day had driven for four hours with visitors; but this had increased the difficulty of the bowels, and much fatigued him. He had had a little headach in the latter part of each afternoon; and he also spoke of a feeling of sinking and exhaustion, which came on about two o'clock each day.

On leaving him on the 30th, he was advised to substitute one-sixteenth of a grain of morphia for the "cholera medicine;" to have the abdomen embrocated with spirits of turpentine, diluted with common spirit; to take a pill of four grains compound extract of colocynth, if the bowels required more action; to have eight or ten leeches applied to the right hypochondrium, if the bowels were more uneasy, and to take two teaspoonfuls of brandy, with water, at 2 P.M. each day, if he felt exhausted.

During the writer's absence he was attended by Dr John Porter, of Marshfield, from whom frequent reports of his condition were received.

On the 6th of October he was visited in consultation with Dr James Jackson, of Boston. The symptoms continued much the same. Mr Webster was about the house, though he had not been out. The opinion was expressed and concurred in, that there was ascites, dependent upon grave disease of some abdominal organ, which would ultimately prove fatal; although some relief might be obtained.

It was decided to substitute a mild tonic for the cardiac mixture; to give one grain of squills night and morning, to be increased if the stomach could bear it; to continue the morphia; and to double the amount of brandy; encouraging him also to take a little animal food.

The symptoms continued much the same until the morning of the 11th, when, on coming down stairs for a drive, he became faint, with nausea and retching, vomiting a little mucus. Visited at 7 P.M.; he complained of extreme distress at the præcordia, for which he was urgent to have relief; the nausea had subsided. A teaspoonful of castor-oil, with one-sixteenth of a grain of morphia, was directed, by which the pain was relieved, and an evacuation obtained about 2 A.M., consisting of much fæcal matter, with very dark bile and gelatinous mucus. All medicines but morphia were omitted; castor-oil being directed to be used if the præcordial distress should return. An annoying symptom, consisting of pains about the feet, of which he had previously complained, was noticed to increase in severity from this time. He continued tolerably comfortable, and able to come down stairs every day; and sometimes to transact considerable business. He was feeble and emaciated, but his spirits were buoyant. Throughout his sickness it was noticed that he did not bend his body forward in rising, but was raised with the body erect; and more than once, upon being assisted to walk, he had said that he felt as if he should fall forwards.

On the 19th, there was a manifest falling off; he had several copious dejections, which were thought to contain some blood, and he had also two turns of retching; by these he was much enfeebled.

On the 21st, at 5 A.M., the dejection consisted of a large quantity of fecal matter, with much bilious and bloody fluid. At 7 A.M. he had another similar dejection, with bilious vomiting. Nausea and retching now became prominent symptoms, and he became more and more feeble, until at 5 P.M., on the 22d, he vomited about a pint of fluid blood with some coagula. During the night the vomiting became more urgent, always with blood; and at 2½ A.M. he had a copious ejection of fluid blood. By all this he was much exhausted. The vomiting of blood continued very profusely; and whenever he attempted to speak, he was interrupted by hiccough or retching.

On the morning of the 23d he announced himself conscious of his situation, and said, "I shall die to-night." From 9 until 1½ P.M. he remained free from vomiting. He was at this time visited by Dr James Jackson, who had frequently been consulted during the progress of the disease. The vomiting of blood recurred during the afternoon. Dr J. Mason Warren arrived towards night, and remained until the patient's death. Mr Webster continued thus gradually sinking from the loss of blood by vomiting, retaining the power of utterance until midnight, and some evidence of consciousness until 1 A.M., and sinking gradually, without convulsion, cold sweat, or haze of the eye, expired at thirty-five minutes past two on the morning of Sunday, October 24.

For the last two days he was supported by such stimulants as he could bear, and was quieted by opiates when required.

The autopsy was made by Dr J. B. S. Jackson, who furnishes the following report.

Autopsy thirty-two hours after death; present Drs Jeffries, Porter, J. Mason Warren, Wyman, Parkman, and Jackson.

The emaciation was very marked, as shewn by the state of the integuments and muscles; the latter being wasted, pale, and flabby.

Abdomen.—The peritoneal cavity contained eleven pints of serum. There were also old and strong adhesions about the spleen, the gall-bladder, the cæcum, and to a small extent between the left extremities of the arch of the colon and the parietes of the abdomen.

The stomach was distended, and contained half a pint of very dark blood, about one half of which was in a state of soft coagulum; and this was the only appearance that was found of coagulum in any part of the body. The mucous membrane was deeply stained by the contents, generally rather soft and in the pyloric portion somewhat mamellonated. The intestines were opened throughout, washed, and fully examined with reference to the diarrhœa that had so long existed. Blood was found throughout in very considerable quantity as far as the descending colon, below which there was no trace of it; in the large intestine it was altered as usual in colour. Mucous membrane stained by the contents so far as blood extended. In the large intestine were numerous herniæ of the mucous membrane, so common in this situation; from many of these small masses of fæces or of mucus could be forced out, and these were the only traces of fæces that were found. Otherwise the mucous membrane of the intestines appeared quite healthy; there being nowhere any ulceration to explain the diarrhœa, nor ecchymosis connected with the hæmorrhage.

The liver was throughout very markedly granulated; dense and contracted in size; the colour externally was greenish or bronzed, but internally everywhere of a pale red; shewing, as we may not unfrequently observe, the inappropriateness of the term cirrhosis, which would generally have been applied to the present case. Weight of the organ, three pounds and one-third, avoirdupois. Bile in the gall-bladder nearly black, and of a tarry consistence.

Spleen small, pale, and shrivelled. Investing membrane to some extent opaque, white, thickened, and condensed; this change being probably due to the old peritoneal affection.

Kidneys and pelvic organs healthy.

Thorax.—Old pleural adhesions over nearly the whole of the right side; none on the left. Lower lobe of the left lung and the two lower lobes of the right much congested, and very dark; a change that undoubtedly occurred towards the close of life, being simply passive.

Heart flaccid; very little blood in cavities, and this was quite liquid. Slight disease of aortal valves, but organ otherwise healthy. Foramen ovale; a small valvular opening existed. Aorta not ossified, except to a small extent in the abdomen.

Head.—The membranes of the brain were most remarkably diseased. In the cavity of the arachnoid was a layer of fibrine which covered almost entirely and about equally the convexity of both hemispheres; it did not extend, however, beneath nor between them, nor about the cerebellum. In the recent state, it had rather a dull, yellowish, infiltrated, œdematous appearance; being one-fourth of an inch in thickness over the upper surface, but becoming gradually more thin on the sides, where it terminated in a thin edge. The adhesion to the dura mater was in some parts quite close; but it was generally very readily stripped off, and left the arachnoid with its usual polish. It was more adherent to the subjacent membrane; this last being irregular, and having generally a clouded and slightly opaque appearance, with many milk-white spots, but without any appreciable thickening. The quantity of serous effusion into the membranes was altogether large. The subarachnoid tissue corresponding to the layer of fibrine above described was infiltrated with a straw-coloured serum in some places, separating the convolutions from each other; this separation was quite remarkable at the posterior part of the right cerebral hemisphere on its upper surface and near the median line, there being also a slight depression at this part. The dura mater adhered firmly to the calvarium, but was healthy in structure, as were the membranes otherwise; there was, however, a serous infiltration into each plexus choroides; though no more, if not less than usual, into the lateral ventricles. No appearance of recent meningitis; and no effused blood or cysts in or about the false membrane. The brain itself was perfectly healthy; and the arteries at the base very nearly so. Cranium healthy. Over the right frontal region a scar existed, the result of the injury that occurred last May; integuments not otherwise remarkable.

A portion of the fibrine from the arachnoid cavity having been removed for microscopical examination, it was found, some hours afterwards, and when the serum with which it had been infiltrated was absorbed, to have almost the consistence of one of the natural tissues of the body; being strong enough to bear considerable traction; it also appeared then to have somewhat of a laminated structure, and bloodvessels were distinctly seen in it even with the naked eye. Dr Wyman found it "organised, and, in some places vascular. Under the microscope, the lymph was resolved into minute fibres, like those forming the white fibrous element of areolar tissue, and including in their meshes large numbers of minute granules."

Recapitulating the points of interest in this case, it will be observed that the immediate cause of death was hæmorrhage from the stomach and bowels. For this, no source could be found in the lesion of any vessel; it must therefore be regarded as a simple exhalation dependent upon a disorganisation of this fluid, indicated, moreover, by the almost entire absence of coagulation. The relation of this hæmorrhage to the disease of the liver will also be noted as coinciding with previous experience; it being well known that, in certain cases where there is an altered action of this organ, there is a tendency to disorganisation of the blood, manifesting itself thus in hæmorrhage.

The morbid appearances observed in the cerebral membranes possess also very great interest in several aspects. It will be unnecessary to dwell upon the particular appearances carefully described above. A very full and clear description of these interesting forms of extravasation has been published by Mr Prescott Hewitt, in the twenty-eighth vol. *Medico-Chirurgical Transactions of London*, and the appearances in this case coincide with those there described. Grisolle (*Pathologie Interne*, vol. i.) has also well described this affection, after the original descriptions of Serres, Baillarger, Boudet, and Prus, who were the first to call attention to this particular lesion. The case of Mr Webster may be regarded as unique, however, in this respect, that no impairment of the power of the nervous system was observed before death; for although a few symptoms, such as his mode of locomotion, his sense of falling, and a slight hesitation of his speech, may now be remembered and connected with this condition, it will be sufficient to prove the entire absence of any suspicions of the kind during life, to state that the brain would not have been examined at the autopsy, except for the desire of making the measurements, &c., recorded below. The connection of this meningeal hæmorrhage with the cirrhotic state of the liver will also give rise to interesting speculation; for although it is quite probable that the origin of the effusion should be ascribed to the accident in May, still it is not unlikely to be remotely dependent upon the disorganisation of the blood consequent upon the disease of the liver, since among Mr Hewitt's cases there are some recorded where an effusion quite equal to this took place in connection with cirrhosis without any injury at all. It is possible, moreover, that the accident may not have been the cause of the effusion, which may have taken place since that time; but, in the presence of what would appear an adequate cause, it will be unnecessary to look beyond.

In the treatment of the disease attention was particularly directed to the duodenal obstruction, relief from which was obtained by the laxatives occasionally administered; and these, with opiates, were almost the only important medical agents.

The following very interesting account of the cranial cavity and brain is furnished by Dr Jeffries Wyman.

The dimensions of the brain, as indicated by the measurements of the cranial cavity,[1] were as follows.

Longitudinal diameter, . . .	$7\frac{7}{8}$	inches.
Transverse ,, . . .	$5\frac{6}{8}$	,,
Vertical ,, . . .	$5\frac{4}{8}$	,,
Breadth of occipital fossa, . .	$4\frac{6}{8}$	,,
,, frontal, ...	5	,,

The posterior clinoid processes were seven-eighths of an inch in front of the centre of the cranial cavity.

The circumference of the head was $23\frac{3}{4}$ inches, and the distance from the meatus of one ear to that of the other, over the top of the head, was 15 inches.

The capacity of the cranium, determined according to the method adopted by the late Dr S. G. Morton, of Philadelphia, was 122 (one hundred and twenty-two) cubic inches.

The substance of the brain was firm to the touch, and, as regards colour and consistence, appeared to be healthy. The depth of the spaces between the convolutions was, on the vertex seven-eighths of an inch, and the "cortical," or gray substance, was three-sixteenths of an inch in thickness.

The corpus callosum, or the great cerebral commissure was large, measured four inches in length from before backwards, and at the central portion was one-fourth of an inch in thickness.

The pineal body, as in the great majority of instances, contained calcareous concretions.

The weight of the brain, including the cerebrum, cerebellum, and medulla oblongata, as far as the lower extremity of the pyramids, was (in avoirdupois)—

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[1] In consequence of its flaccidity, the natural diameters of cerebral substance are no longer preserved after the brain is removed from the cranial cavity; its diameters are, therefore, more correctly measured by determining those of the cavity which it filled.

	Lb.	Oz.	Drachms.	Grs.	Grains.
Brain (encephalon),[1]	3	5	8	17·75	= 23,424·0
Cerebrum,	2	14	7	14·09	= 20,330·5

The measurements which have been given above, are almost without exception of unusual proportions. The average length of the cranial cavity does not exceed six and a half inches; its transverse diameter is five inches, and the vertical a little less.[2]

The cranial capacity was very unusual, the largest which has yet been recorded, though measurements in cubic inches have as yet been made by comparatively few observers. In Dr Morton's Tables of the measurements of 623 crania of different nations, including Caucasians, Mongolians, Malays, Americans, and Negroes, only four instances occur in which the capacity exceeded 100 cubic inches. Of these the largest were one English skull, measuring 105, and one German 114 cubic inches. According to Dr Morton, the average capacity for the Teutonic family (including English, Germans, and Anglo-Americans) is 92 inches.[3]

The two superficial measurements of the head were very nearly those of Cuvier, the circumference of whose head was 22 inches 4 lines (French), and the measurement from ear to ear over the top was 15 inches. The circumference of Napoleon's head is reported to have been 23 inches.

The weight of the brain deviated much less from the average than the measurements; it was entirely out of propor-

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[1] In troy weight, the result was as follows:—

	Pounds.	Ounces.	Pennyweights.
Brain, ...	4	0	16
Cerebrum, ...	3	6	6

[2] Dr Morton gives the average diameters for European and Anglo-American skulls as follows:—Longitudinal, 6½; tranverse, 5½; and vertical, 5 inches. These measurements, however, are external, and include the thickness of the skull, and would, therefore, be too large, by the thickness of the cranial walls, to represent the size of the brain. (*Human Anatomy*, p. 70. Philadelphia, 1849.)

Cruveilhier, following Bichat, makes them somewhat less than those given in the text. His mode of measurement, however, does not give the greatest dimensions of the cranial cavity. (See his *Traité d'Anat. de l'Homme*, t. i. p. 140. Paris, 1843.)

[3] Catalogue of Skulls of Man and the inferior Animals in the Collection of Samuel George Morton, M.D., Philadelphia, 1849. (See Comparative Table on page viii., and Specimen No. 434.)

Dr J. B. S. Jackson, in the Descriptive Catalogue of the Anatomical Museum of the Boston Society for Medical Improvement, has given the measurements of thirty skulls of different nations, the largest of which, a Theban and a Negro, were 95 inches each. Of ten Hindoo skulls, measured by Dr S. Kneeland junior, the largest, that of a rajah, contains 92 inches. (*Proceedings of Boston Soc. Nat. Hist.* vol. iii. p. 213.)

tion to the unusual dimensions of the cranial cavity. The average weight of an adult healthy male brain is 49½ ounces, or 3 pounds 1½ ounces avoirdupois.[1] As has been already stated, there existed an effusion of serum into the subarachnoid areolar tissue, and of serum and lymph into the arachnoid cavity. The lymph had existed for a long time. It covered the convex surface of the cerebral lobes, was a quarter of an inch in its thickest portion, and extended to the sides, where it became quite thin. Both serum and lymph, there can be no doubt, encroached upon and occupied the space once filled with cerebral substance. The weight given above, therefore, cannot be regarded as being equal to the weight of the brain in a state of health. This last we now have no means of determining except by an approximation, which has been made in the following manner, in accordance with a suggestion by Professor Treadwell of Cambridge.

The specific gravity of the brain is, according to Cruveilhier and others, 1030, water being 1000. A cubic inch of water weighs 252·5 grains, and 122 cubic inches (the cranial capacity), would equal 30,805 grains, to which must be added 3 per cent., or 924 grains (the excess of specific weight of brain over water), which gives 31,829 grains as the full capacity of the cranial cavity in weight for cerebral substance. The brain, however, does not actually fill the whole cavity; a correction must therefore be made for the spaces occupied by the tentorium, falx, sinuses, the *dura mater* of the calvaria, and the cephalo-spinal fluid at the base of the brain. If we deduct eight ounces for such spaces, we shall have an actual weight of 28,329 grains; or, if nine ounces are deducted, 27,891 grains. Taking the last approximation as the one the least liable to error of excess, Mr Webster's brain will be found to rank among those whose brains are generally cited as instances of remarkable size, as follows:—

	Lb.	Oz.	Dr.	Gr.		Gr.		Oz.
Cuvier,[2]	4	0	5	10	=	28,147	=	64⅓

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[1] This is the result of observations on 278 adult healthy male brains. See Sharpey's Quain's Anatomy, Dr Leidy's edition, vol. ii., p. 186. This determination is based on the combined observations of Reid, Sims, Tiedemann, and Clendinning, which are all reduced to avoirdupois weights.

[2] In the official report of Cuvier's *post-mortem* examination, the weight of the brain is given as 3 livres, 11 ounces, 4·5 gros, poids de marc, or old French weight; this, reduced to avoirdupois, gives the weight in the above table. It has, however, been differently stated by physiological writers. Tiedemann reports it at 3 lb., 11 oz., 4 drs., 40 gr., avoirdupois. (Memoir on the Brain of the Negro, Philos. Trans., 1836, p. 502.) This erroneous computation has been often repeated: and is the one given in the Cyclop. Anat. and Physiology, Art. Nervous System, p. 664, and in other works. It is correctly stated in Sharpey's Quain's Anatomy.

	Lb.	Oz.	Dr.	Gr.		Gr.		Oz.
Webster,	3	15	12	0	=	27,891	=	$63\frac{3}{4}$
Abercrombie,[1]	3	15	0	0	=	27,562	=	63
Spurzheim,[2]	3	7	1	0	=	24,089	=	$55\frac{1}{16}$
Dupuytren,[3]	3	1	10	27	=	21,738	=	$49\frac{1}{16}$

The brains, the weights of which (in avoirdupois) are included in this table, are not the only ones on record remarkable for size. In the table of Dr Sharpey already quoted, there are enumerated, as weighing between 55 and 59 ounces avoirdupois inclusive, 28 brains; and between 60 and 65 ounces, 7.[4] Nothing is said of the individuals from whom they were taken; of the two largest, one weighed 63 and the other 65 ounces; it is not improbable that these were the brains of Abercrombie and Cuvier; 63 ounces being precisely the weight of the former. In making out the table, all instances with fractional parts were classed with the next integral number; and, as Cuvier's brain weighed over 64 ounces, it would rank as 65 ounces. If this be not the explanation, then there is on record a larger healthy brain than that of Cuvier.

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[1] Quoted from Sharpey's Quain's Anat., vol. ii., p. 187.

[2] Anatomical Report on the Skull of Spurzheim, read April 2, 1835, before the Phrenological Society of Boston, by N. B. Shurtleff, M.D. Annals of Phrenology, vol. ii., p. 72. Boston, 1835.

[3] Dupuytren's brain was really not remarkable for size, being only two drachms above average; it is generally erroneously reported at 4 lb., 10 oz., troy. An official report, signed by Broussais, Cruveilhier, Housson, and Bouillaud, which may be found in the *Revue Médicale*, 1835, states it to have weighed only 2 livres, 14 ounces, poids de marc. This, reduced to avoirdupois is equal to the amount given in the table.

[4] In estimating brains by weight, it must be borne in mind that quantity and not quality is considered; the anatomist has no means of determining quality. The head of Byron may be cited as an instance where small size was associated with great activity. Lord Napier informs us, that of fourteen persons who dined with him on one occasion, not one could wear Byron's hat. Napier's servant, who had the smallest head in the 90th Regiment, so small that he required to have his caps made expressly for him, tried on Byron's hat and found that it just fitted him. See Moore's Life of Byron. In Dr Bruno's report of the autopsy of Byron, his brain is said to have weighed "six pounds (*mediche*)." See Count Gamba's Narrative of Byron's last Journey to Greece, p. 271, London, 1825. This must be an error, if the pounds are those of apothecaries' weight. The above anecdote shews that his head was not large. Thorwalsden's bust does not give it unusual elevation; and Moore states that it was "disproportionately small." His habit of shaving off his hair gave it an appearance of elevation.

ART. VII.—*Discovery that the Veins of the Bat's Wing (which are furnished with valves) are endowed with Rythmical Contractility, and that the onward flow of blood is accelerated by such contraction.* By T. WHARTON JONES, F.R.S., Fullerian Professor of Physiology in the Royal Institution of Great Britain, Ophthalmic Surgeon to University College Hospital, and Corresponding Member of the Society of Biology of Paris, &c. &c. (Philosophical Transactions for 1852.)

In entering on the investigation of the state of the blood and the bloodvessels in inflammation excited in the web of the bat's wing, I applied myself, in the first place, to the study of the distribution, structure, and endowments of the arteries, capillaries and veins of the part, and of the phenomena of the circulation in them.

I had not observed the circulation under the microscope long, before I was struck with something peculiar in the flow of blood in the veins; I therefore directed my attention to them, and discovered that they contracted and dilated rythmically. Following the veins for some extent in their course, I further discovered them to be provided with valves, some of which completely opposed regurgitation of blood, others only partially.

The cause of the peculiarity in the flow of blood in the veins was thus no longer doubtful; but some continued observation was required before I was able to make out exactly its mode of operation.

The act of contraction of the vein is manifested by progressive constriction of its caliber and increasing thickness of its wall; the relaxation of the vessel, by a return to the former width of caliber and thickness of wall.

The rythmical contractions and dilatations of the veins are, in the natural state, continually going on; but sometimes with greater, sometimes with less rapidity, and sometimes to a greater, sometimes to a less extent. The average number of contractions in a minute, I have found to be ten. I have on some occasions counted only seven or eight, and on other occasions as many as twelve or thirteen. Most usually, the numbers were nine and eleven. The supervening dilatations take place rather more quickly than the contraction. The amount of constriction of one of the larger veins,—one about $\frac{1}{300}$th or $\frac{1}{400}$th of an inch in width when dilated,—at each contraction of its walls, may be put down at a fourth or fifth of its whole width when in a state of dilatation; I have sometimes estimated it at nearly a third, sometimes at not more than a sixth.

The contractions *centrad* and *distad* of a valve appeared to be simultaneous, as did also the dilatations.

The smaller veins, those of the first and second order, proceeding from the radicles, contract, but not in a very marked manner, and are destitute of valves.

During contraction, the flow of blood in the vein is accelerated. On the cessation of the contraction, the flow is checked, and a tendency to regurgitation of the blood takes place, which brings the valves into play. Where the valves are perfect, the backward movement of the blood is at once stopped by their closure; but where the valves are not complete, the blood regurgitates more or less freely.[1] But this check to the onward flow of the blood is usually only for a moment or two. Already, even while the vein is in the act of again becoming dilated, the onward flow of blood recommences and goes on, though comparatively slowly, until dilatation is completed and contraction supervenes; whereupon acceleration of the flow takes place as before.

It is to be observed, that in determining the flow of blood in the veins (the phenomena of which I have now described), the action of the heart is concerned as well as the contractions of the veins themselves. It appears to be the heart's action which maintains the onward flow of blood during the dilatation of the vein, whilst it is the contraction of the vein, coming in aid of the heart's action, which causes the acceleration. Sometimes the *vis a tergo* is sufficient to keep up a pretty steady flow in the veins, this being only accelerated at each contraction of these vessels.

The check to the flow of blood in the veins takes place at the completion of the contraction or commencement of the dilatation. The number of checks observable in a minute, therefore, corresponds with the number of contractions. In one case, while an assistant marked the time by a seconds' watch, I observed that a complete valve checked the tendency to regurgitation nine times in a minute; and on counting the number of contractions of the same vessel, I found them also nine in a minute. In another case, eleven checks and eleven contractions were counted; and so on repeatedly. Though I quote these little experiments, I would remark that, after some practice in the observation, the eye is quite able to take in at one glance the succession and relations of the two phenomena.

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[1] Sometimes, as for example, into a venous branch with an incomplete valve, a retrograde flow of blood takes place from a large vein, at the moment this latter is contracting and propelling its blood onwards.—May 7, 1852.

The valves of the veins are composed sometimes of but a single flap, sometimes of two. In the situation of a valve, and *centrad* of the insertion of its flaps, the veins present the usual dilatations or sinuses corresponding to the sinuses of Valsalva at the origin of the pulmonary artery and aorta. These sinuses are best seen when the valve happens to present its flaps edgeways to the observer.

Valves are found close to the entrance of a large branch, but distad of it. They are also found at intermediate parts of the veins. Tracing the veins from radicles to trunks, the first valves I have noticed were at the junction of the second order of veins to form the third.

In watching the circulation, it is interesting to observe the backward eddy of blood-corpuscles into the sinuses of the valves, when the blood issues from the narrow valvular opening into the wide part of the vein beyond.

In structure, the valves are seen to be a reduplication of the clear innermost coat of the vein, with sometimes a pretty evident layer of fibrous tissue intervening.

Each vein is closely accompanied by an artery, a nerve only intervening. The average diameter of a vein is to that of its accompanying artery as about 3 to 2.

The contractility of the arteries is altogether different in its nature from that of the veins. It is *conic contractility, not rythmical.* On the application of pressure over an artery, this vessel may be seen to become constricted, sometimes even to temporary obliteration of its caliber, and that uniformly throughout some extent of its course, both above and below the point where the pressure was applied; or, the constriction is greater or less at intervals, so that the vessel presents a varicose appearance. This tonic contraction of the arteries of the bat's wing does not take place quite so quickly as the same phenomenon in the frog's web, and, ordinarily, continues a longer time.[1]

The pulsation of a vein so affects its accompanying artery as to push the latter, as a whole, to and fro. That the movement of the artery referred to is really owing to this cause, and not to any pulsation or rythmical contraction and dilatation of its own walls, is evident from this, that the movements are synchronous with the contractions and dilatations of the vein, and that *both sides of the artery move in the same direction*, not approximating and receding from each other, so as to constrict or dilate the caliber, as in the case of the vein.

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[1] When a frog under examination struggles, the arteries of the web are seen to become constricted. I have observed the same thing in the web of the bat's wing and in the ear of a white rabbit.

I have not been able to observe unequivocal evidences of tonic contractility of veins in addition to their rythmical contractility. When pressure is, at the same time, applied over the vein as well as the artery, the vein is not found to become tonically constricted in the same manner as the artery, upward and downward. At the place where the vein was pressed on, a mechanical indentation of its wall may perhaps be seen. And, in addition to this, there may often be observed an appearance of great and abrupt constriction. This appearance, however, is not owing to contraction of the walls of the vein, but to a deposit of a viscid-looking grayish granular lymph within the vessel at the place, obstructing its channel and narrowing the stream of blood. On watching, I have seen portions of this deposit detached and carried away by the stream of blood, with corresponding enlargement of the channel, and again an additional deposit with renewed narrowing of the stream. When the pressure has been considerable, I have seen the vein become for a time wholly obstructed by the deposit. A similar deposit of lymph takes place in the artery. In one case, I observed that the artery, at the place pressed on, was actually not so much constricted as above and below, though, on account of the narrowness of the stream of blood from the presence of the lymphy deposit, it appears as much so at first sight.

Having subjected the web to the galvanic influence from a single pair of plates, I found all the smaller arteries of the part in a state of considerable tonic constriction, but the larger arteries constricted in a less degree. The effect of galvanism on the veins appeared to be to render their rythmical contractions somewhat more brisk, they having been previously rather languid. On cutting a vein across, I did not observe tonic constriction of it, any more than in the frog.

After the application of a drop of Vinum opii to the web, the veins were found dilated as well as the arteries, and their rythmical contractions appeared to be suspended.

It has been stated, by an authority not liable to err, that, on mechanical irritation, both artery and vein of the bat's web gradually contract and close, and, by and by, dilate wider than before. And, again, that in bats contraction of veins is quite as well marked as that of arteries.

These statements, it will be observed, imply tonic contractility of the veins.

Notwithstanding my attention has been repeatedly directed to the point, I have not, as previously stated, been able to observe unequivocal evidences of tonic contractility of veins, in addition to their rythmical contractility. For this reason, I cannot help venturing on the supposition that Mr Paget[1] must have made his statements either from a hasty and imperfect observation of the proper rythmical contractions of the veins; or, seeing that in rythmical contraction of the veins, the constriction is never to closure, like that of the arteries, under some such misapprehension as to the nature of the vessel observed, as he certainly must have laboured under when he supposed that arteries and veins of the second and third order open directly into each other without any intermedium of capillaries.

The arteries and their subdivisions anastomose freely with each other, forming a network all through the web, the meshes of which go on to diminish towards the free margin. Each artery, and each subdivision of an artery, is closely accompanied by a vein; and these veins, like the arteries they accompany, anastomose with each other. But it is to be remarked, that nowhere do the arteries and veins directly communicate. The only communication is the usual one through the medium of capillaries. The capillaries, the walls of which are destitute of contractility, receive the blood from small arterial twigs, which arise from the arterial network, and return it to the venous radicles which open into corresponding veins. These arterial twigs, capillaries, and venous radicles, form networks within the meshes of the great vascular network, and a looped network at the margin of the web.[2]

The observations recorded in the preceding pages were made principally with one-eighth of an inch object-glass, and the two lowest eyepieces, affording magnifying powers of 370 and 550 diameter.

The web of the wing was stretched out on the object-plate, wetted on both sides with water, and covered with a thin plate of glass at the spot to be examined.

APPENDIX TO THE FOREGOING PAPER.

In consequence of the dark pigment in the cells of the epidermis of the web of the bat's wing, the structure of the vessels cannot be well made out except by dissection.

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[1] Lecture on Inflammation at the Royal College of Surgeons in 1850.

[2] I shall have occasion to treat of this point more in detail in a paper on the state of the blood and bloodvessels in inflammation of the web of the bat's wing.

A small piece of the web containing vessels being detached and disposed in a drop of water, under the simple microscope, the two layers of skin may be readily torn from each other with needles, and the artery and vein, with their accompanying nerve, which lies between the two, separated in one bundle.

In pieces cut out of a web which had been dried, the bundle of vessels and nerve was, after tearing away the skin, left surrounded by a sheath of cellular and elastic fibres disposed longitudinally; but in pieces cut out from the living web and directly examined, this sheath was always detached along with the skin, and the vessels, with their accompanying nerve, at once laid bare.

Both artery and vein are seen to have a middle coat of circularly disposed muscular fibres; but the appearance of the fibres is different in the two vessels.

The fibres of the vein are about $\frac{1}{8600}$dths of an inch broad, pale, grayish, semi-transparent, and granular-looking. In general aspect they very much resemble the muscular fibres of the lymphatic hearts of the frog. In none of the muscular fibres of the vein, however, did I detect an unequivocal appearance of transverse marking.

The fibres of the middle coat of the artery are not so pale-looking as those of the middle coat of the vein, are clearer, and exhibit a more strongly marked contour.

SECOND APPENDIX.

From a microscopical examination of the bloodvessels and circulation in the ears of the long-eared bat, I have ascertained that, different from what I discovered to be the case in the wings, the veins of the ears are unfurnished with valves, and are not endowed with rythmical contractility, and that the onward flow of blood in them is consequently uniform. I ought, perhaps, to qualify the statement that the veins of the ears are not endowed with rythmical contractility, by saying, that I think I noticed a very slight tendency to it here and there in a vein, but so slight as not to have the smallest effect on the flow of blood.

This observation regarding the ear of the bat illustrates how that the heart's action is sufficient of itself for the circulation of the blood in the body generally; but that being sufficient for that only, the supplementary force of rythmical contractility of veins, supported by the presence of valves, is called forth to promote the flow of blood in the wings, which, on account of their extent, are, as regards their circulation, in a considerable degree, though not entirely, beyond the sphere of the heart's influence.

I may take this opportunity to mention, that I have also found the veins of the mesentery of the mouse destitute of rythmical contractility.

ART. VIII.—*The Coloration and Glazing of the Teas of Commerce.* By R. WARRINGTON, F.C.S. (The Quarterly Journal of the Chemical Society, No. xiv. 1851. Art. xv. P. 156.)

In the year 1839, on the 16th of August, a Report on the Manufacture of Teas in China and the kingdom of Assam was published by Mr C. A. Bruce; and in this report, which was soon after republished in the Edinburgh New Philosophical Journal, it was stated that the articles used in glazing and colouring various forms of the green teas especially, was indigo, with sulphate of lime.[1] It appears now, according to the results of positive analysis by Mr Warrington, that this colour never is communicated by means of indigo, but by another article much less costly, namely, Prussian blue or prussiate of iron.

Mr Warrington shewed in a former communication to the Chemical Society in February 1844, that there are two kinds of green tea, known in commerce as the glazed and the unglazed; that the glazed is coloured by the Chinese with a mixture of Prussian blue and gypsum, or sulphate of lime, to which a yellow vegetable colouring matter is sometimes added; that the unglazed kinds are merely dusted with a small quantity of gypsum powder; and that in the specimen of what is called Canton gunpowder this glazing or facing is carried to the highest degree. Mr Warrington then also stated, that he had never met with a sample of green tea, in which the blue tint was given by means of indigo. Since the date of the publication of that paper Mr Warrington has received from various parties of experience much additional information, which may be interesting upon an article in such general dietetic use.

It was stated in the report by Mr Bruce, that the Chinese call the former (the indigo) *Youngtin;* the latter, the sulphate of lime, *Acco.* According to Mr J. Reeves, one of the authorities of Mr Warrington, this is a mistake. Indigo, he believes, is never employed for colouring tea; and the term

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[1] Edinburgh New Phil. Journal, October 1839, vol. xxviii. 1840. P. 126.

Youngtin, as used by Mr Bruce, should be Yong-teen, that is, foreign blue, the name given by the Chinese to Prussian blue, in contradistinction to Too-teen, native blue, or indigo.

Another doubt was thrown upon the inferences drawn by Mr Warrington. Mr Fortune, in his work on China, says of the ingredients used in dyeing the northern green teas for foreign markets (p. 201), " There is a vegetable dye obtained from *Isatis indigotica*, much used in the northern districts, and called Tein-ching, and it is not unlikely that it may be the substance which is employed." Again, at page 307, Mr Fortune says, " I am very much inclined to believe that this, the Tein-ching, is the dye used to colour the green teas which are manufactured in the north of China for the English and American markets."

This question Mr Warrington thinks is now settled, and the experimental evidence he had adduced, placed beyond doubt, by positive demonstration. Mr Fortune forwarded from the north of China for the Industrial Exhibition specimens of these materials, which, from their appearance, are undoubtedly fibrous gypsum calcined, turmeric root, and Prussian blue; the latter of a bright pale tint, most likely from admixture with alumina or porcelain clay. Alumina and silica were found in the former analysis, and their presence was attributed to the possible employment of kaolin or agalmatolite.

Mr J. R. Reeves, in a letter to Mr Thompson, dated 1st July 1844, says, " Mr Warrington's experiments have led him to correct results as to the substances used, which I know to be Prussian blue, fibrous gypsum, and turmeric; the second being sulphate of lime; and the last the yellow or orange-coloured vegetable substance mentioned by Mr W., but not named. The colouring is not intended as an adulteration; it is given to suit the fancy of foreign buyers, who judge of an article used as a drink by the eye, instead of the palate. You well know how little the London dealers like the yellowish appearance of uncoloured green tea. The Americans a few years ago carried the dislike farther than the English; and therefore the Chinese merchant had scarcely any chance of selling his tea unless he give it a face which would suit them. The small quantity of colouring matter used must preclude the idea of adulteration as a source of profit. Mr J. Reeves states, that in the East India Company's time, gypsum and Prussian blue were sometimes used upon hyson teas; Tien Hing using the first, on his pale bright hyson; Lum Hing the latter, on his dark bright leaf. But these were only in minute quantities, just sufficient to produce a uniform face.

The gypsum in its calcined state is used, Mr Warrington thinks, for the purpose of absorbing moisture, and enabling the tea the better to withstand the damp of the sea voyage. Mr Warrington received from Dr Royle, since his last communication, a sample of green tea from the Kemaon District in the Himalayas, which is quite free from facing; and the green teas of Java are likewise without this covering.

ON BLACK AND GREEN TEAS.

Though the distinct preparation of green and black tea from the respective plants, the *Thea viridis* and the *Thea Bohea*, has been warmly advocated by many botanists, yet it is now generally admitted by all parties, that green and black teas can be and are made, indiscriminately from the same parcel of leaves, taken from the same species of plant. It is nevertheless, well known to all persons, that the infusions from these teas have marked differences in colour and flavour, and that the effects produced in certain constitutions by green tea, such as nervous irritability, sleeplessness, &c. are very different from those arising from the use of black tea. Their characteristic physical differences are well known; but they possess peculiar chemical properties to be noticed immediately, and which have always been ascribed by chemists to the effect of high temperature in the process of manufacture.

To explain these pecularities, Mr Warrington directs attention to certain changes which take place in herbs and vegetable substances dried in different modes. From observations made upon various substances of this kind, in the routine work of the establishment, to which Mr Warrington is attached, especially the exsiccation of medicinal herbs, he had been led to form certain inferences as to changes taking place in these articles. These herbs are for the most part nitrogenous plants, as *Atropa belladonna, Hyoscyamus niger, Conium maculatum,* and others. The plants are brought to the establishment by the growers or collectors from the country, tied up in bundles, and when they arrive fresh and cool, they dry of a good *bright green* colour; but on the contrary, it is found, that if they are delayed in their transit, or remain in a confined state for too long a period, they become heated, from a species of spontaneous fermentation, and when loosened and spread open, they emit vapours and are sensibly warm to the hand. When such plants are dried, the whole of the *green colour* is found to have been destroyed; and a *red-brown* and sometimes a *blackish-brown* tint is the result. Mr Warrington also noticed, that a clear infusion of such leaves, evaporated carefully to dryness, was not all undissolved by water, but left a quantity of *brown oxidized extractive matter*, to which the denomination of *Apothene* has been applied by some chemists. A similar result is obtained by the evaporation of an infusion of black tea.

The same action takes place upon the exposure of the infusions of many vegetable substances to the oxidizing influence of the atmosphere. They become darkened on the surface; and this gradually spreads through the solution, and on evaporation, the same *oxidized extractive matter* will remain insoluble in water.

Mr Warrington further found that the green teas when wetted and re-dried, with exposure to the air, were nearly as dark in colour as the ordinary black teas. From these observations, therefore, Mr Warrington was led to form the conclusion, that the peculiar characters and chemical differences which distinguish black tea from green, were to be attributed to a species of heating and fermentation accompanied with oxidation by exposure to the air, and not to its being submitted to a high temperature in the process of drying, as has been generally believed. This opinion received some confirmation by ascertaining from parties conversant with the Chinese manufacture, that the leaves for the black teas were always allowed to remain exposed to the air, in mass, for some time before they were roasted.

Mr Ball, in his work on the manufacture of tea,[1] has described in detail the whole series of these processes, fully confirming the opinion previously formed by Mr Warrington. Some of these facts had been published in Batavia in 1844. by Mr Jacobson in the Dutch language.[2] In the preface to his work Mr Ball says: "It will be seen by dates incidentally adverted to, that the facts and most of the materials of this work, were established and collected thirty years ago."—"These facts, as well as other materials, were derived from conversation with growers and manipulators from the tea districts; from written documents furnished by Chinese; from published works in the same language diligently sought out; and also from correspondence with a Spanish missionary long resident in the province of Fokim. These were all put into their present form full twenty years ago, and were read to one or two friends during my residence in China."—"They were not, however, so arranged, with any view to immediate publication."—"They were thus disposed as the best mode of recording and keeping together, the facts and materials I had collected."—"But it was not till the year 1844, when I received Mr Jacobson's Handbook on the Cultivation of Tea in Java, that I found my own views so far confirmed, and my information such, as to justify me in bringing my labours to a close."

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* An account of the Cultivation and Manufacture of Tea in China. By Samuel Ball, Esq.

† Handboek v. d. Kultivation en Fabrik von Theo.

Of these facts the following is a summary.

The processes peculiar to the preparation of black tea, are styled Leang-Ching, To-Ching, and Oc-Ching, and these all consist in carefully watched and regulated processes of *spontaneous heating* or *slow fermentation* of the leaves until a certain degree of fragrance is developed. The leaves are said to *wither and give*, and become soft and placid. The utmost care, practical skill, and experience is required in the properly conducting these operations; and as soon as the proper point is arrived at, the leaves are to be immediately removed to the Kuo or roasting-pan. After being roasted and rolled two or three times, they are then to be dried, and this is effected in the Poey-long, which consists of a cylinder of basket-work, open at both ends, and covered on the outside with paper; it is about 2½ feet in height and 1½ in diameter, which diameter is diminished in the centre like an ordinary dice-box to one foot and a quarter. This stands over and round a small charcoal fire, and is supplied with cross-bars about fourteen inches above the fire, on which an open sieve containing the tea is placed; and a small aperture about an inch and a half in diameter is made in the centre of the tea with the hand, so that an ascending current of air and the products of the combustion pass through and over the tea contained in the sieve. A circular, flat bamboo tray is placed partially over the mouth of this cylinder, and most probably serves to regulate the rapidity of the ascending current; prevent the admission of the cold air to the leaves, and at the same time allow a sufficient outlet for the generated watery vapours and the products of combustion. At the commencement of this operation, the moist leaves are still green and retain their vegetable appearance; after the drying has continued about half an hour, the leaves are turned, and again submitted to the heat for another half-hour; they are then taken out, rubbed and twisted, and after sifting away the small dust, again returned to the sieve and drying tube. This operation of sifting is very necessary, to remove any of the small tea or dust which might otherwise fall through the meshes of the sieve on to the fire, and the products of their combustion would deteriorate and spoil the flavour of the tea. The leaves have now begun to assume their black colour; the fire is diminished or deadened by ashes; and the operation of rolling, twisting, and sifting, is repeated once or twice until they have become quite black in colour, well twisted, and perfectly dry and crisp. They are then picked, winnowed, and placed in large quantities over a very slow fire for about two hours, the cylinder being closed.

Now, that this black colour is not owing to the fire is evident; for in cases mentioned by Mr Ball, where the leaves have been dried in the sun, the same colour is obtained; and on the other side, if roasted first, without the process of fermentation or *withering*, and then finished in the Poeylong, a kind of green tea is produced.

In the operations for the manufacture of green tea, on the contrary, the freshly-picked leaves are roasted in the Kuo at once, without delay, at a high temperature; rolled and roasted again and again, assisted sometimes with a fanning operation to drive off the moisture; and always with brisk agitation until the drying is completed.

The marked differences in the mode of manufacture of black and green tea, will, after what has been stated, fully account for all the variation of physical and chemical properties already mentioned.

ADULTERATION AND SOPHISTICATION OF TEAS.

Since writing the former paper, several teas have come under the notice of Mr W., which must be classed under this head. The first he mentions is a sophistication which has been carried on in this country to some extent, and consists in giving the appearance of green tea to an imported black tea. The material used as the bodies for this process of manufacture is a tea called scented caper; it is a small, closely-rolled black tea, about the size of small *gunpowder*, and when coloured, is vended under this latter denomination, the difference in price between the scented caper and this fictitious gunpowder being about 1s. per lb., a margin sufficient to induce the fraud. This manufacture has been carried on, it is understood, at Manchester, and was kept as secret as possible; and it was only after considerable trouble that some friends succeeded in obtaining two different specimens for Mr W., that could be fully depended on, as originating in this manufactory. It appears that it is generally mixed with other tea, so as to deceive the parties testing it. How this manufacture was conducted, he is not prepared to say; but some preparation of *copper* must have been employed, as the presence of that metal is readily detected in the specimens received. It is understood, however, that this sophistication has ceased.

There is another adulteration of the most flagrant kind. Two samples of tea, a black and a green, were lately put into Mr W.'s hands by a merchant for examination, the results of which were allowed to be made public. The black tea was styled *scented caper;* the green, *gunpowder;* and it is understood they are usually imported into this country in small chests called catty packages. The appearance of these teas is remarkable; they are *apparently* exceedingly closely rolled, and very heavy; the reasons for which will be clearly demonstrated. They possess a very fragrant odour. The black tea is in compact granules, like shot of varying size, and presenting a fine glossy lustre of a *very black* hue. The green is also granular and compact, and presents a bright pale bluish aspect, with a shade of green, and so highly glazed and faced, that the facing rises in clouds of dust when it is agitated or poured from one vessel to another; it even coats the vessels or paper on which it may be poured. On examining these samples, in the manner described in his former paper, to remove this facing, Mr W. was struck by the tenacity with which it adhered to the surface, and which he had never remarked in any previous sample, requiring to be soaked for some time in the water before it could be detached; with this precaution, however, the greater part of the facing material was removed. It proved, in the case of the sample of green tea, to be a pale Prussian blue, a yellow vegetable colour, which we now know to be turmeric, and a very large proportion of sulphate of lime. The facing from the sample of black tea was *perfectly black* in colour, and on examination was found to consist of earthy graphite or black lead. It was observed, that during the prolonged soaking operation, to which these teas had been submitted, there was no tendency exhibited in either case to unroll or expand, for a reason which will be presently obvious. One of the samples was therefore treated with hot water, without however any portion of a leaf being rendered apparent. It increased in size slightly, was disintegrated, and then it was found that a large quantity of sand and dirt had subsided; this was separated by decantation, and collected; it was found to amount to 1·5 drains from 10 grains of the sample, or 15 in the 100 parts. It was evident, however, that much of the lighter particles must necessarily have been lost in the process of decantation. A weighed quantity of the sample was therefore carefully calcined, until the ash was quite white, and the whole of the carbonaceous matter burnt off; it yielded a result equivalent to 37·5 in the 100 parts. During this operation also, no expansion or uncurling of the leaf, as is generally to be observed when heat is applied to a genuine tea, was seen; in fact, it was quite evident that there was *no leaf to uncurl*, the whole of the *tea* being in the form of dust. The question next presented itself as to how these materials had been held together, and this was readily solved; for, on examining the infusion resulting from the original soaking of the sample, abundant evidence of the gum was exhibited.

The sample of green tea was of a precisely similar kind to the black. It yielded 4·55 grains of ash, &c. from 10 grains of the specimen, or 45·5 per cent. A specimen of Java gunpowder yielded 5 per cent. of ash; so that we have in this sample 40·5 per cent. of dirt and sand, over and above the weight of ash yielded by the incineration of a genuine tea.

Thus we have, then, in these samples a mixture of tea-dust with dirt and sand, agglutinated into a mass with a gummy matter, most probably manufactured from rice-flour, then formed into granules of the desired size, and lastly dried and coloured, according to the kind required by the manufacturer, either with black lead, if for black tea; or with Prussian blue, gypsum, or turmeric, if intended for green.

Since examining these two samples, Mr W. obtained through a friend another specimen of green tea, having a very different appearance; that is, better manufactured, or rather, it should be said, more likely to deceive the consumer, from its being made to imitate an *unglazed tea*. This is of a yellowish-green colour, scented and granulated as the former samples, and not much dusted; it yielded 34 per cent. of ash, sand and dirt.

On inquiry, Mr W. learnt that about 750,000 lbs. weight of these teas had been imported into this country within the last eighteen months, their introduction being quite of modern origin; and he understands that attempts have been made to get them passed through the Customs as *manufactured goods*, and not as teas; a title which they certainly richly merit; although it must be evident, from a moment's consideration, that the revenue would doubtless be defrauded, inasmuch as the consumer would have to buy them as teas from the dealer. It is to be feared, however, that a market for them is found elsewhere. The Chinese, it appears, will not sell them except as teas, and have the candour to specify them as *lie* teas; and if they are mixed with other teas of low quality, the Chinese merchant gives a certificate, stating the proportion of the *lie tea* present with the genuine leaf. This manufacture and mixing is evidently practised to meet the price of the English merchant. In the case of the above samples, the black is called by the Chinese, *lie flour caper*; the green, *lie gunpowder*; the average value is from 8d. to 1s. per lb. The brokers have adopted the curious term *gum and dust*, as applied to these lie teas or their mixtures, designations which at first Mr Warrington had some difficulty in understanding, from the rapid manner in which the two words were run together.

Mr Warrington subjoins the results obtained from the careful incineration of a variety of teas, as they may be interesting, for the purpose of comparison, and illustrate the points already mentioned as to these spurious teas being mixed with genuine ones.

Gunpowder tea, made in Java, gave 5·0 grains of ash in the 100 parts;

Gunpowder, during the East India Company's Charter	5·0
Kemaon hyson	6·5
Assam hyson	6·0
Lie gunpowder, No. 1	45·5
,, No. 2	34·0
Scented caper	5·5
Lie flower caper	37·5
Mixtures containing these lie teas, No. 1	22·5
,, ,, No. 2	11·0

PART II.

CRITICAL ANALYSIS.

Art. I.—1. *On Pulmonary Consumption; and on Bronchial and Laryngeal Disease: with Remarks on the Places of Residence chiefly resorted to by the Consumptive Invalid.* By Sir Charles Scudamore, M.D., F.R.S.; of the Royal College of Physicians, London; Honorary Member of Trinity College, Dublin; and of the Imperial College of Physicians, Vienna, &c., &c. London, 1847. 8vo. Pp. 259.

2. *The Nature and Cure of Consumption, Indigestion, Scrofula, and Nervous Affections.* By G. Calvert Holland, M.D., lately Physician to the Sheffield General Infirmary, Bachelier des Lettres of the University of Paris, &c. London, 1850. 8vo. Pp. 208.

3. *Practical Suggestions for the Prevention of Consumption.* By George Calvert Holland, M.D., lately Physician to the Sheffield General Dispensary, &c., &c. London, 1850. 8vo. Pp. 143.

4. *A Practical Synopsis of Diseases of the Chest and Air-Passages: with a Review of the several Climates recommended in these Affections.* By James Bright, M.D. London, 1850. Post 8vo. Pp. 271.

5. *The Nature, Symptoms, and Treatment of Consumption, being the Essay to which was awarded the Fothergillian Gold Medal, by the Medical Society of London.* By Richard Payne Cotton, M.D., Member of the Royal College of Physicians, London; and Assistant Physician to the Hospital for Consumption and Diseases of the Chest. London, 1852. 8vo. Pp. 286.

6. *A Treatise on Tuberculosis, the Constitutional Origin of Consumption and Scrofula.* By HENRY ANCELL, late Surgeon to the Western General Dispensary, and Lecturer on Materia Medica and Medical Jurisprudence in the School of Anatomy and Medicine, adjoining St George's Hospital, &c., &c. London, 1852. [September.] 8vo. Pp. 779.
7. *Pulmonary Consumption, and its Treatment.* By WILLOUGHBY MARSHALL BURSLEM, M.D., Licentiate of the Royal College of Physicians; senior Physician to the Blenheim Dispensary. London, 1852. [October.] 8vo. Pp. 160.
8. *The Spirometer, the Stethoscope, and Scale-Balance; their use in discriminating Diseases of the Chest, and their value in Life Offices; with Remarks on the Selection of Lives for Life Assurance Companies.* By JOHN HUTCHINSON, M.D., Assistant Physician to the Brompton Hospital for Consumption and Diseases of the Chest; Physician to the Britannia Life Office, &c. &c. London, 1852. 8vo. P.79.

A disease which prevails to so great extentamong the population of the British islands as Consumption, which annually causes so large a proportion of mortality, will always be a subject of interest among professional inquirers. The deaths from Pulmonary Consumption amounted in the latter half of the year 1837 to 27,754, which is equivalent to 20 per cent. of the total number of deaths, or nearly four annually among 1000 living. In 1838, the mortality from Consumption was 27,935 among males, and 31,090 among females; making a total mortality of 59,025. This is equivalent to two-thirds of the mortality from all diseases of the respiratory organs, 90,823; and a fifth and sixth part of the total mortality from all diseases during the same year, that is, 175,046 males and 167,485 females, or of both sexes 342,529. The population of England and Wales during this year, 1838, was estimated on the 1st of October to amount to 7,668,265 males and 7,885,615, or 15,553,880 persons of both sexes.

In 1841, the deaths by Consumption in England and Wales amounted to 59,592, of which 7,326 took place in London alone. The population of England and Wales at this time was 7,783,791 males and 8,144,086 females, or 15,927,867 of both sexes; and that of the metropolis was 1,873,676.

In the year 1842, the mortality from Pulmonary Consumption in England and Wales amounted to 59,291, of which 7145 deaths took place in London. This was rather a diminution, considering especially that the population must have been augmented by the addition of at least one-tenth, or 200,000 persons. The population of London at this time was estimated to be 1,875,493.

These numbers do not include Scotland and Ireland. In the former country the total population amounted in 1841 to 1,241,862 males and 1,378,322 females, or 2,620,184 of both sexes. It is not very likely that the rate at which Consumption prevails and destroys the human race is smaller in Scotland than in England; and if it bear the same proportion to the total amount of the population, then it appears that the annual average amount of deaths from Consumption in Scotland must be close upon 9800 persons. This sum added to the 59,592 cut off in England and Wales, amounts to 69,392 persons in Great Britain alone.

We possess not the same means of ascertaining the extent to which Consumption prevails among and destroys the inhabitants of Ireland. But there is reason to believe that the annual number of deaths cannot be overstated in that country at 25,000 persons.

Dr Cotton represents the mortality from Phthisis in the year 1840 in England and Wales, as deduced from the Reports of the Registrar-General, to be 71,106 persons. (Introduction, page 3.) This is rather a higher figure than we have been able to make the number, and probably includes some kindred and allied diseases; for instance, tubercular diseases in general, and various affections of the organs of respiration. The annual number of deaths from this cause in the year 1840, does not indeed appear to have been above 60,000; in exact numbers, 59,923; a number sufficiently high without doubt, to be produced in the population from this sole cause. Even in the year 1847, seven years subsequent to the period referred to by Dr Cotton, we find the annual mortality from Pulmonary Consumption is stated in the tables at 25,083 males and 28,234 females, or 53,317 of both sexes. During the same year, the whole diseases of the respiratory organs destroyed 27,637 males and 23,478 females, or 51,115 persons of both sexes; while under the head of tubercular diseases, are placed the large numbers of 33,188 males and 34,776 females, or 67,964 persons of both sexes.

It appears, further, from the eleventh annual report of the Registrar-General, embracing the abstracts for the year 1848, that during that year the mortality by pulmonary consumption in England, including London, was 27,995 males, and 30,230 females, or 58,225 persons of both sexes. This though an increase above the mortality of 1847, is a diminution in the amount of persons destroyed in previous years. But it is not certain whether the apparent diminution be not caused by greater accuracy in the distinctions of the returns, or by some other circumstance, unconnected with any positive diminution in the prevalence of the disease and the mischief caused by it. It is proper that the fact should be made known, such as it is. As to its cause, there are no facts which enable any one at present to speak with certainty or confidence upon it. Some will be disposed to say that it proves that the disease is more under the control of treatment. A happy circumstance will it be, if this prove to be the case. But there is very little ground to believe, that this forms the true interpretation of the fact now stated. The explanation is yet to be sought for.

In short, it is impossible to doubt that, after all reasonable deductions, a very large amount of deaths is produced, by this disease, in the population of England and Wales alone; and that the annual mortality cannot be stated at much below 59,000 or 60,000 persons; while if Scotland be included, the number will assuredly be made, at least, 9000 more, or perhaps nearer10,000; that is to say, probably 68,000 persons.

All this mortality, it is further to be remembered, falls chiefly upon persons who either have just become adult, or who are between the ages of fifteen and forty years; and in this repect the mortality by Pulmonary Consumption admits of comparison only with the inflammatory disorders of the lungs, as Pneumonia, Bronchitis, and Pleurisy: and with Typhus Fever; all of which diseases, are, at least so far as they are fatal, chiefly observed among persons of adult age.

It is quite indispensable to give these details from the most recent authorities, because there is considerable reason to believe, that previous to the returns made to the Registrar-General by Act of Parliament in 1837, all former estimates were erroneous in probably overstating the numbers. Our principal authority upon this point is Dr William Woolcombe of Plymouth. This author, from a careful examination of the lists of patients admitted at the Plymouth Public Dispensary between November 1798 and August 1805, and other sources, arrived in 1808 at the conclusion that, while the population of Great Britain amounted at that time to eleven millions, the annual victims to Consumption in the whole island were not less than fifty-five thousand persons.[1] If this estimate were correct, the mortality from Consumption, with the increased population at present, that is, eighteen millions, ought to be at least ninety thousand, and probably not much under one hundred thousand persons.

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[1] Remarks on the Frequency and Fatality of Different Diseases, &c. By William Woolcombe, M.D. London, 1808. P. 73.

It is, therefore, not at all wonderful, that to the elucidation of the causes of this disease, to the probable means of its prevention, and to the discovery of means of arresting its progress, and, as often is proposed, of curing it, medical writers should devote so large a proportion of attention ; and that so many works should from time to time be published, the object of which is to ascertain the causes, to prevent the formation, and to oppose the progress of this pernicious destroyer of the human race.

The works, the titles of which are prefixed to this article, are in different modes, and on different accounts entitled to attention, independent of the interest and importance of the subject of which they propose to treat.

The treatise of the late Sir Charles Scudamore is one of very considerable utility. Its principal object is to improve, to simplify, and to render as effectual as possible the different remedies and modes of treatment which have been recommended for the prevention, the alleviation, and the cure of phthisical symptoms. The author takes a comprehensive view of all those means, whether medicinal, dietetic, or climatic, which have been at different times, and by different persons, proposed with the view of preventing the formation of consumption, retarding its progress, alleviating its symptoms and effects, and, if possible, of curing the disease. The work is one of interest, and will be perused with advantage.

Of the two treatises by Dr Calvert Holland, the first proposes to consider minutely the etiology of the disease, and thereby to form a suitable method of prophylactus and treatment. In the second, the author applies his speculative and theoretical principles in order to establish a system of hygienic and prophylactic directions.

The Practical Synopsis by Dr James Bright would scarcely be entitled to be classed among the other works, in so far as the author professes to give a general view of all the morbid affections incident to the lungs and the air-passages. But as among these he places Pulmonary Consumption, and as the third part of his book is devoted to the subject of Climate, as a prophylactic and therapeutic agent, it is perhaps not out of place to mention the Synopsis, as presenting, in a short compass, several useful pieces of information.

The performance of Dr Payne Cotton is a very instructive and valuable contribution to illustrate the Etiology, Natural History, and Treatment of Consumptive Disorders. The author takes a comprehensive view of the disease in its origin, its progress, and its effects; and as his position as assistant physician to the Hospital at Brompton, has given him great facilities for studying the circumstances under which the disease is most readily produced, and those under which its symptoms are occasionally relieved and disappear, he has placed before the profession a large amount of interesting information, which, it is impossible to doubt, will be serviceable in establishing rules for preventing the formation of Consumption, and improving the method of treatment.

The work of Mr Ancell is a most comprehensive and elaborate Treatise. The subject is that of Tubercular Diseases in general; that is, not only Pulmonary Consumption, which forms so large a proportion of those diseases in this country, but all those disorders in which the formation of Tubercles is either a part, a cause, or an effect. To it belongs the unquestionable merit of being the fullest, and it may be said, if we except the work of M. Lebert, almost the only comprehensive treatise on the subject.

The publication by Dr Burslem contains a short but useful view of the several characters of Pulmonary Consumption, offers a more ample view of the Therapeutic means to be adopted in different stages of the disease, and directs particular attention to the beneficial effects which may be expected to result from the employment of emetics in relieving the symptoms and promoting the cure of Consumption.

There is certainly no disease on which so many writers have communicated the results of thought, speculation, observation, and experience, as Pulmonary Consumption; yet none upon which the opinions of medical authors shew so great and such frequent marks of discordance. Joseph Frank enumerates not fewer than two hundred and nineteen medical writers, who either directly and professedly, or incidentally, and along with other diseases, have treated of the causes, the nature, and the prevention and cure of Consumption; and since the time when he wrote in 1824, it would be possible to enlarge the list by at least forty more. Yet notwithstanding all this large amount of activity, not only is the disease as incurable and equally fatal as it was two hundred years ago; but the ideas of physicians on its pathological essence are undergoing frequent changes and modification. In 1815, Dr Thomas Young published his Practical and Historical Treatise on Consumptive Diseases; and though, in the course of thirty-seven years, much knowledge has been acquired which has necessarily thrown this volume far behind the present state of information, it is nevertheless most useful in shewing the various stages through which pathological speculation and practical appliances have passed in the course of rather more than two centuries and a half.

Several of the physicians of the seventeenth century had formed upon the nature of Pulmonary Consumption opinions which, though long treated with neglect, make in several respects a near approach to the doctrines which are looked upon with greatest favour in modern times. Among those who are most entitled to attention, Thomas Willis and Richard Morton, both London physicians, are entitled to the most distinguished place.

Thomas Willis, who regards the terms *Phthisis* and *Tabes* as equivalent, considers them to denote in their proper signification Atrophy, or wasting of the solid parts, with loss of strength; and although this affection, he allows, ofttimes proceeds from solution of continuity or ulcer in the lungs, yet sometimes wasting and pining of the whole body arises without lesion of these organs, or from mere disease of the blood, or chiefly that of the nervous fluid. Before, therefore, he treats of Pulmonary Consumption in particular, he thinks it proper to explain the general causes of this disease, and to shew in how many modes, and from what causes, *Dyscrasiæ* of the fluids are wont to induce, as it were, pining and atrophy of the whole body.

It is here to be remarked that this notion or fancy of *Dyscrasia* or bad mixture, or distemperature of the fluids, has been entirely renounced and forgotten by English physicians, yet is firmly maintained as an admitted article of pathological faith by German and other Continental physicians, and is currently mentioned as such in their writings at the present day.

Willis continues to remark, that in truth pulmonary wasting (*Tabes*) proceeds not proximately and directly from an ulcer and corruption of the lung, but it arises whenever the blood contracting thence a taint (*labes*) and highly contaminated thereby, wholly loses its nutritious quality. Such an innutritive disposition, both the blood and also the nervous fluid, he maintains, acquire from many other causes.

First, as to the blood, it is ofttimes to be observed that certain persons without cough, and without apparent disease in the lungs or chest, pine away, and daily suffer a loss of the usual amount of flesh, even though appetite, digestion, sleep, and the economy of the natural and animal functions continue moderately well; yet, as if food were conveyed into a a perforated receptacle, they are by no means nourished, and notwithstanding all dietetic rules, they are perceptibly wasted.

It is scarcely to be doubted that the instances of wasting here referred to, do not, strictly speaking, belong to pulmonary consumption. From imperfect knowledge and errors in diagnosis, there is tolerably clear evidence, that various wasting diseases, depending upon lesions of organs quite different, were referred to the head of pulmonary consumption.

Depraved or degenerated states of the blood, Willis proceeds, which are wont to induce atrophy, that is, simple want of nutrition, consist either in a peculiar *Dyscrasia* of this liquid, or they are derived from other sources, principally either from the viscera or from degeneration of the nervous fluid.

Willis was a good deal of a chemist, and he consistently gave his pathology a chemical element. The only drawback was, that, in his time, chemistry was not well understood; and consequently, any chemical speculation is more than doubtful. His notions, nevertheless, merit being made known.

The peculiar tabific Dyscrasia of the blood is twofold, according as the saline acid or the sulphurous and very acrid particles are increased above measure, and predominate over the others. For the blood, in truth, sometimes deviates from its genuine, that is sweet and volatile disposition, into an acid state, as is seen in certain scorbutic, melancholic, and cachectic cases. By reason of this the nutritious juice, constantly added to the mass of blood, cannot be assimilated and applied to the solid parts. It is soon again rejected, and is, forthwith, excreted either by the urine, the skin, or by diarrhœa; or being accumulated in the cellular tissue within the cavities, it induces dropsy.

Distinctly the contrary to this, there is another atrophic state of the blood, when it is unusually hot and sulphurous, and always very fiery, and by its effervescence wastes the nutritive juice, and causes its excessive evaporation, so that the solid parts, being deprived of their just proportion, pine away.

He then shews how the blood is liable, not from any change in its own characters, but from taints derived from ulcers, depraved nervous fluid, unhealthy states of the viscera, obstructions of the chyliferous vessels, hard tumours in the spleen, the liver, the pancreas, and the mesentery, part of the intestine, the kidney, the womb, ulcers, or cancerous tumour of the bladder, to become contaminated, and, without lesion of the chest or lungs, to cause mortal atrophy.

It is not difficult to see that, in this catalogue of maladies, and in another which follows, embracing tumours, abscesses, and ulcers of various organs, as causes of contamination of the blood; it must be of little moment whether the blood be thus believed to be diseased or not. Any one of these maladies has been known to be sufficient to cause wasting of the flesh and loss of strength, until the patient is brought to the tomb.

In a subsequent chapter on Phthisis properly so named, or *Tabes* induced by disease of the Lungs, Willis undertakes to explain more fully his ideas regarding the origin and nature of the disease. He shews that Phthisis proceeds so frequently and commonly from disease of the lungs, that not a few have considered the disease as peculiar to this organ; and certainly, he adds, when it must be allowed, that the blood acquires its most perfect degree of elaboration in the lungs, it must be granted that, if these organs are diseased, the blood also must partake in the contamination.

Willis thinks, however, that the usual definition of Phthisis, namely, that it is a wasting of the whole body, arising from an ulcer or ulcers in the lungs, is not quite correct; and for this he assigns the oft-repeated argument, that he had opened the bodies of several persons cut off by this disease, and found in them the lungs free from any ulcer, but occupied by tubercles, stones, or sandy matter. As the blood could neither, in such circumstances, circulate free in the large vessels, nor be adequately animated by nitrous air (be oxygenized), and must in the meantime be incessantly defiled by the presence of its own excrementitial parts, it must often become diseased, and unfit for the purposes of nutrition, and may thus acquire the phthisical taint. He therefore infers, that Phthisis is more properly defined to be a wasting of the whole body, proceeding from faulty conformation of the lungs.

He then proceeds to inquire into the origin of the tabific matter; but beyond refuting the old doctrine that it descends like a distillation from the head and brain, as was imagined to be the case with catarrh, arrives at no definite result. In the subsequent prosecution of this subject, he rather reasons in a circle, than adduces any satisfactory proof of the correctness of his inferences. When, after the long continuance and gradual increase of cough and expectoration, he proceeds, fluid is copiously deposited from the mass of blood into the lungs; this fluid enters principally the *vesiculæ* of the windpipe, and at length fills and distends them. Every morning, however, it is almost entirely ejected by expectoration, with relief to the sense of weight in the chest, and greater freedom in breathing. Shortly after, however, the blood, replenished with serum and nutritious fluid, pours out new matter into the lungs, the air-vesicles are again filled, and by the daily accumulation are distended and enlarged; and at length the lateral walls of two or more giving way, many air-vesicles are converted into one, like a lake; within which the Tabific matter is abundantly collected, becomes putrid, and forthwith corrupts the substance of the lung to which it is attached, and hence communicates its taint to the circulating blood.

This is the idea which Willis forms of what the schools at that time called the Conjunct Cause, and the Formal Reason; circumstances upon which it is quite clear that no very perspicuous or definite notions were entertained. The Procatarctic and Evident causes, that is, the predisposing and exciting, were more palpable. These operated in inducing the former. They all concurred in causing serous fluid, or, as is popularly said, catarrhal fluid, to be deposited from the mass of the blood within the air-vesicles of the lungs, and the other tracheal ducts.

It is here to be observed that Willis employs the term *Trachea* to signify both the windpipe and the bronchial divisions; and the serous or catarrhal fluid of which he speaks is the crude and morbid lymph which subsequent observers found to occupy the interior of the vesicles and the pulmonic cellular tissue, and when coagulated, to constitute the matter of tubercles.

Willis then lays down the doctrine, that the morbific cause consists of two elements, and that at the same time there is a *Dyscrasia*, or bad constitution of the blood, sending hurtful matter to the chest, and that there is weakness or atony of the lung, which readily receives this noxious material.

The dyscrasial states of the blood, again, are several, and of different sorts; being susceptible of deprivation of itself, and in consequence of that of the nervous fluid, depraved lymph in the chyliferous and lymphatic vessels, or by the presence of materials of secretion which ought to have been excreted, whether arising from the suppression of ordinary and natural evacuations, the repulsion of eruptions, as itch, and other *exanthemata*, or the suppression of the usual cutaneous transpiration.

To the second head he refers, 1. faulty conformation of the chest: 2. innate debility of the lungs, which he explains as hereditary disposition to consumption; 3. previous diseases of the chest, as Pleurisy, Empyema, Peripneumony, Vomica of the Lung; sometimes Smallpox and Measles, and sometimes Anomalous Fevers, which have not come to crisis.

He then adverts to the effects of the inspired air as causes of Phthisis; the air of populous cities, moist marshy air, with little ventilation, the smoke of turf and coal fires. The smoke of turf or peat fires, he thinks, is less productive of phthisis than that of coal fires.[1]

Thomas Willis was not a little speculative in his doctrines and his deductions from facts. He diligently studied anatomy, healthy and morbid, and this was one cause why his speculations were less tinctured with mere fancy than otherwise they would have been. His Physiology and Pathology were certainly not in all instances just; but what physician in those times had sound ideas on these subjects. Willis was, nevertheless, a man of great genius, indefatigable in observation and research, and not a few of his speculative ideas may be traced in the doctrines of modern times.

The treatment employed by Willis, like that of all the physicians of the same period, is detailed, and abounds in the use of immense numbers and varieties of remedies and formulæ for medicines. It is indeed too lengthened to be here repeated. It is sufficient to say that he establishes three indications; *first*, to allay or remove the disorder of the blood from which proceed the fluxions of serum; *secondly*, to derive from the lungs to the pores of the skin, the urinary passages, and other excretory outlets, the waste or effete recrements of the blood, and any refuse matter fit to be removed from that fluid; and, *thirdly*, to strengthen the lungs against the inroads of the serum and other fluids, and to protect them against the attacks of external cold.

For these purposes he recommends good and sufficient clothing; that the patient should keep his room, or even keep in bed, and should rarely quit the house; that, morning and evening, slight perspiration should be encouraged by drinking warm decoction of rosemary or sage; that if the cough become severe, bloodletting should be employed according to the strength and the constitution of the patient; that pectoral or demulcent decoctions should be given; that medicines prepared from sulphur are useful against the cough; that diaphoretics, diuretics, and gentle laxatives, according to the symptoms and their effects, are beneficial; that millepeds, volatile salt of amber, and other fixed salts, and testaceous, that is chalk, powders reduced into pills with turpentine, are often exhibited with advantage. He then recommends the use of tinctures, *eklegmata,* balsams, powders, troches, pills, and decoctions, to such an extent as would be quite sufficient, if not to kill the patient, at least to destroy all appetite and power of digestion.

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[1] Thomæ Willis Pharmaceutice Rationalis; Sive Diatribe de Medicamentorum Operationibus in Humano Corpore. Partis Secundæ, Sectio I., Cap. 5 et 6. Apud Opera Omnia. G. Blasio. Amsterdami, 1682.

Such was the discipline to which, in the latter half of the seventeenth century, phthisical patients were subjected. By far the greater number of course died as phthisical patients before ; but they died not in peace. To them there was no *enthanasia.* Life was embittered by the quantities of medicine which they were, according to the rules of art, compelled to swallow, and often it was difficult to say whether the disease alone was most distressing, or the treatment most irksome and tormenting. Few, very few, indeed, recovered, and when recovery took place, it was not in consequence of treatment, but in spite of it.

Richard Morton published his PHTHISIOLOGIA on the last day of September one thousand six hundred and eighty-nine, the year following the accession of William Prince of Orange, to whom the work is dedicated.

Phthisis, according to Morton, is either original or symptomatic.

Original or Idiopathic Phthisis is that which derives its origin from a morbid disposition of the blood, the *Dyscrasia* of Willis, or of the animal spirits residing in the nervous and fibrous system, and not from any previously formed disease. Of this there are two species, *Atrophia* and *Phthisis pulmonaris.*

Atrophy he regards as universal wasting, proceeding from the whole habit of the body, not from any morbid defect of the lung or any other organ, and unattended with remarkable fever. It is either Nervous, or dependent upon Inanition.

Pulmonary Phthisis is a universal wasting of the parts, arising from a morbid affection, or obstruction, swelling, inflammation, and ulceration of the lungs, attended from the commencement with cough, difficult breathing, and other thoracic symptoms of that kind, and with fever, at first slow and hectic, then inflammatory, and eventually of an intermittent putrid character.

Symptomatic Phthisis is that which, though it springs directly from the *Crasis* of the blood, or the tone of the spirits being subverted, yet indirectly depends upon the existence of other previous diseases which have first communicated this peculiar taint or character to the spirits and fluids.

In his Account of *Atrophia* or Nervous Phthisis, it is quite easy to perceive, from the fact of its being observed in persons returned from Virginia, and in those, where it took place in England, who indulged in the liberal use of spirituous liquors, as well as from its symptoms and terminations, that the disorder was not Phthisis at all, but Disease of the Liver, most probably that which is now known under the name of Kirrhosis. Of this, therefore, it is unnecessary to say more.

Morton then describes various forms of *Tabes* or Pining, all of which are manifestly ultimate consequences of previous diseased states of very different kinds; Hæmorrhage, Gonorrhœa, and Leucorrhœa; Abscesses and Ulcers, as Lumbar Abscess, Diseased Joints, Abscess of the Liver, the Kidneys; Atrophy from Lactation, from Dysentery, and Diarrhœa, that is, Ulceration of the Bowels; Diabetes, Salivation, Dropsy, and Profuse Sweating. It is manifest that in all these instances the Atrophy or loss of flesh and strength is a symptom and effect of some internal process of disintegration of an important texture or organ. It must be admitted, nevertheless, that Morton was quite aware, that these forms of Wasting Disease are entirely distinct from Pulmonary Consumption.

The cause of Idiopathic Pulmonary Phthisis in general, he defines to be a bad disposition of the whole mass of blood and the nervous spirit, gradually induced by various procatarctic or disposing causes, by which the acrid or malignant serum secreted through the soft and glandular texture of the lungs fills the lungs themselves, inflames them, and at length causes ulceration, which indeed is the essential cause (*Causa continens*) of the disease.

The procatarctic or disposing causes, he arranges under eleven heads. First, the suppression of wonted and habitual evacuations, that is, suppression not only of natural discharges, but of discharges to which the system had become accustomed; secondly, mental emotions, especially the depressing and disturbing; thirdly, excess and unseasonable use of food and drink, especially the excessive use of wine and spirituous liquors; fourthly, neglect of usual exercises; fifthly, nocturnal studies and long watching; sixthly, marshy air, and dense air loaded with the smoke of coals; seventhly, hereditary disposition; eighthly, faulty conformation of the chest, natural or accidental and acquired; ninthly, contagion; tenthly, stony concretions preternaturally engendered in the lungs, or nails and other foreign hard bodies introduced into the lungs, [the *bronchi,*] during laughter or otherwise, causing not only cough and expectoration, but hæmoptoe, abscess, and ulceration; and, in the eleventh place, certain diseases which vitiate the diathesis of the blood and the spirits. The last, he observes, is the cause of what he calls Sympathetic Phthisis; or where the disease may be the effect of Scurvy, Scrofula, Convulsive and Hysterical affections; Fever, especially Agues; Scarlet Fever, Smallpox, Measles; Stone in the Kidney, Lues Venerea; Asthma, Hæmoptoe, Peripneumony, Pleurisy, and other diseases of the chest not properly cured; lastly, Chlorosis, Melancholy, Gout, and Rheumatism.

It is manifest that Morton here ascribes the incipient and paramount influence in cases of Phthisis to morbid states of the blood. Not that he overlooked the influence of tubercles; for of these bodies and their effects upon the lungs, he gives a correct description. But it appears that he ascribed their formation to some morbid condition of the blood, which he regarded as the primary and initial cause of that form which he calls Idiopathic Phthisis.[1]

The *Phthisiologia* of Richard Morton was for a long series of years, more than half a century, regarded as the great and principal authority on Phthisis; and Sauvages, when he published his Methodic Pathology, in the year 1739, and afterwards in the improved form of the Methodic Nosology, in 1763, by adopting, almost without exception, all his distinctions and definitions, contributed to place the character of the work upon a more solid and extensive foundation. Indeed the whole of the definitions and classifications of the three genera of *Tabes*, *Phthisis*, and *Atrophia* given by Sauvages, are avowedly taken from the Treatise by Morton.

The treatment recommended by Morton was complex. At first, means were to be employed to soothe and allay the supposed acrid state of the blood; such as the use of milk diet, chalybeate mineral waters, mucilaginous remedies, and balsamics. In the second place, the supposed morbid matter and fluid delitescent in the body was to be expelled and elicited by means of emetics, cathartics, diuretics, and diaphoretics. Thirdly, obstructions were to be removed by the use of steel, balsamics, good air, volatile salts, and similar remedies. Fourthly, the hectic and colliquative heat and the catarrhal state of the blood was to be counteracted or at least moderated by seasonable and sufficient venesection, which, though sometimes hurtful in confirmed phthisis, is nevertheless very efficient in the incipient disease; "And I doubt not," says Morton, "that in consequence of omitting this remedy, or using it too sparingly in the beginning of the disease, tubercles very commonly derive their origin, by means of which phthisis is immediately precipitated into the second and more deadly stage of the disease."

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[1] Phthisiologia seu Exercitationes de Phthisi Tribus Libris Comprehensæ Totumque Opus variis Historiis Illustratum. Authore Ricardo Morton, M.D., et Collegii R. Medicorum Londin. Socio. Londini, 1689, 8vo, pp. 106. Lib. I. et II.

In the fifth place, care should be taken to protect the affected part, by maturing the concoction of the catarrhal serum constantly flowing to the lungs; and removing entirely the troublesome cough along with its cause. For this purpose, not only are alterative and mucilaginous medicines, commonly called pulmonary, to be employed; but gentle evacuants, abstergents, and expectorants; also incrassants and opiates are to be prudently administered.

In the second stage of the disease, when he thinks tubercles are forming in the lungs, with dry troublesome cough, and while they continue crude, without signs of softening or ulceration, the indications are nearly the same as in the first; except that, in consideration of the increased degree of hectic heat, the physician should insist upon the liberal use of alterative medicines; but, on the other hand, considering the diminished strength of the patient, evacuations of all kinds are to be sparingly employed; and the dissolution of the tubercles is to be diligently attempted by the use of balsamics, chalybeates, antiscorbutics, Millepeds, and other means of the same kind.

Afterwards, when by the inflammation and maturation of the tubercles, the patient has arrived at the last, and, most commonly, the fatal stage of the disease, new curative indications arise.

In the inflammatory state of the tubercles, as the lungs are in a state of peripneumony, Morton still recommends seasonable bloodletting; the use of cooling and cordial juleps to sooth irritation of the blood and repair strength; very slender diet; and the copious use of pulmonary medicines, especially oily and mucilaginous remedies.

After the inflammation of the tubercles has proceeded to ulceration, the peripneumonic fever is followed by very colliquative putrid intermittent; all evacuating means are then contraindicated, and the treatment is confined to the use of cordial pulmonary medicines, opiates, lubricating and abstergent remedies. The attempt to eradicate the putrid fever should be made; but for this purpose, Peruvian bark is an insidious medicine. It is best to trust to very gentle cathartics, proper diet, gentle emetics, chalybeate mineral waters, diuretics, diaphoretics, pulmonary remedies, lubricating and expectorant remedies, carminatives, deobstruents. It is not difficult to perceive that, recommending such a catalogue of medicines, is equivalent to saying that not one of them is or can be of the slightest service.

The theory and the practice of Richard Morton were, nevertheless, for a long time the theory and practice both of English and of Continental physicians. The first persons who simplified the treatment much were Dr Huxham and Sir John Pringle; and this they did not by any deep or elaborate pathological research and reflection, but merely by observing symptoms and the usual course of the disease.

Dr Huxham, indeed, had a considerable amount of confidence in certain states of the solids and fluids, and reasoned, upon the whole, well on those states, in explaining the origin and phenomena of diseases. But the point on which the judgment and sense of Dr Huxham most clearly appear, is the strong condemnation that he pronounces upon the complicated prescriptions which were then in fashion, upon the multiplied medicines given for the treatment of disease, and upon the uselessness of all medicines and the formulæ of these days, unless the disease was well understood, and the physician had distinct ideas of the objects, with which medicine was given and medical treatment pursued. "When a physician knows whether stimulants or anodynes, relaxants or restringents, attenuants or incrassants, are indicated, he can be at no loss how to serve himself of proper Drugs out of the vast Materia Medica which we at present abound with. He should select a few of the most effectual of each sort and stick to them, and not run into the immense farrago which some are so fond of. By so doing, he will soon be acquainted with their real virtues and effects, and readily distinguish between the symptoms of the disease and those caused by medicines, which is a thing many times of no small importance. I have really seen in private practice and some public writings, such a jumble of things thrown together in one prescription, that it would have puzzled Apollo himself to know what it was designed for."[1]

"As for those who will neither read nor reason, but practise by rote and prescribe at a venture, I must seriously advise them at least to peruse the Sixth Commandment."

The public writings to which Huxham here refers, were not only those of Willis, Morton, and their contemporaries, but the pharmacopœias and the writings of almost all Continental physicians, who, from Fernel and Sennert down to the time (1748) at which Huxham was preparing his Account of the Diseases of the Devonshire Coast, and much later, continued to write prescriptions and compound medicines, as if the merit and benefit to be derived from them depended upon the multiplicity, the contrariety, and the absolute inutility of the ingredients.

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[1] An Essay on Fevers, &c. By John Huxham, M.D., F.R.C. Physicians, Edinburgh, F.R.S. The Third Edition. 1757. 8vo. Preface.

The remedies employed by Huxham were chiefly emollients, mucilaginous medicines, nitre, expectorants, the revellent influence of blisters, occasional small bloodlettings, inhalations, and purgatives; above all, to counteract and allay inflammation and congestion in the lungs.[1]

Similar in a great degree was the course pursued by Sir John Pringle. Speculative principles hung, indeed, very loosely about the military physician. In early life he had to treat soldiers on the field and in the hospital; and he appears to have thought that, as the disease was often the effect of a neglected cold, that is catarrh, which proceeded to *bronchitis* and peripneumony, so if this could be cured by one, or two, or three bloodlettings, a blister and other antiphlogistic medicines, the dreaded phthisical consequences would not follow. His success in this procedure, encouraged him to try the effect of repeated bloodlettings, after the symptoms of phthisis seemed to be proceeding; and he found that by repeating the bloodletting once a week, with the use of low diet, blisters over various parts of the chest, and setons, the symptoms gradually disappeared, and patients were often cured.

The patients whom Sir John Pringle had to treat, were most of them young men, probably robust originally, whatever they might be after a few campaigns in the wet encampments of the Low Countries. Their pulmonary diseases were mostly the effects of exposure to cold and moisture, with imperfect clothing, and poor shelter from the weather. When therefore they were placed in dry warm quarters, treatment would be at once more efficient, and the energies of the system would have greater freedom to act. Under these circumstances doubtless not a few cases of diseases, apparently phthisical, might get perfectly well under the treatment; and perhaps a few cases in the incipient stage of true phthisis might recover, when seasonably and early placed under treatment. Cases of bronchitis which had passed from the acute to the chronic stage, and cases of peripneumony allowed to proceed in the field to the suppurative stage, might in such circumstances, be restored to comparative and apparent health. It is a matter of great doubt whether any cases of genuine tubercular disease in the lungs were really restored. It appears, at all events, from the subsequent history of the practice of Sir John Pringle, that the methods which he employed in the military hospitals and upon the frames of soldiers, were not attended with success in civil life. In one circumstance, however, he greatly simplified and improved the treatment for phthisical cases. He was among the earliest who recognised the hurtful effects of the balsamic substances, so strongly recommended upon an erroneous hypothesis by Bennet, Willis, and Morton, and in which his views were confirmed and corroborated by Dickson and Fothergill; and he strenuously urged the beneficial effects of milk and grain diet, with exposure to fresh air and gentle exercise.

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[1] Observationes de Aere et Morbis Epidemicis Plymuthi factæ ab anni initio 1738, ad initium usque 1748. London, 1752.

As the eighteenth century advanced, the original doctrines of Willis and Morton on the morbid state of the blood were either lost sight of, or they were little mentioned. Huxham is almost the last who maintains formally the existence of morbid states of the blood. Not that the idea was wholly abandoned; but apparently amidst the attention that was given to morbid anatomy and pathological reasonings founded on its facts, the attention of physicians was either diverted to the prevention and the resolution of tubercles, or they proceeded, like Sir John Pringle, very much on the empirical plan of prescribing and directing to be done what seemed, or was thought, to be beneficial, and avoiding and prohibiting what seemed to be detrimental. To this result contributed the writings of John Fothergill and William Cullen, and the researches of William Stark and Sir James Carmichael Smyth.

The effects of remedies empirically observed upon the disease were not forgotten, and contributed to the same result. Such were the use of emetics employed at almost all times of the history of medicine, the use of *exutoria*, or issues, the use of *phellandrium aquaticum*, the use of *digitalis*, the inhalation of factitious airs, the inhalation of the vapour of tar, the employment of tonic medicines, and nutritious diet by Joseph Frank, by May, by Charles Pears, and others, Iceland moss, *Arbutus Uva ursi*, and not a few other agents. Climate also and atmospheric temperature became a subject of investigation of great interest; and while the climate of Italy, and then the south of France, the climate of Madeira, the Azores, and similar situations, were subjected to trial as residences prophylactic or curative, the situations in our own island most protected and most favourable to pulmonic invalids were examined and described by many observers.

All these therapeutic means have been tried; and all may be said to have been found unavailing. The fact cannot be concealed, that when phthisis appears to be cured, it is not in consequence of remedies employed, and medicines or medical treatment directed, but very often from some other causes little connected with the treatment. The treatment most rational and most natural, seems in the great majority of instances to make no impression on the disease. Treatment of symptoms does not in all instances afford the relief expected. In a few instances either the disease undergoes a spontaneous amelioration, and finally amendment; or the symptoms become gradually less urgent, the patient takes food, and derives from it nourishment and strength, and the disease appears at least to be cured.

Meanwhile, during the last half century, considerable changes in doctrine have taken place among physicians, and and though there is less room for changes in practice, there also changes may be recognised. After the disease has been investigated by the aid of observation during life, and morbid anatomy after death, with the greatest possible care, in every possible mode, and by the most able and intelligent inquirers, physicians have arrived at the conclusion, that though tuberculation of the lung is a part of consumption, it is a part to which little or no attention need be given in establishing therapeutic indications and principles of treatment. It was probably perfectly necessary to pass through the whole of this preliminary, laborious inquiry, to discover that morbid anatomy teaches only the effects of the disease; and that though it is not without its use to know these effects, yet the sooner we discard this knowledge, or, at best, treat it as a thing to be considered as a curiosity, not to be applied to any useful or practical purpose, it is the better for patients.

It cannot be denied that it is highly important in every point of view, both etiological and therapeutic, to look beyond the mere existence of tubercles; to look to the cause, if possible, upon which their existence and formation depends. This has never been altogether overlooked by physicians; for Willis and Morton thought that they could trace the formation of those bodies to the blood; and all those who, like Mossman, Joseph Frank, Lloyd, Carsewell, Phillipps, Glover and Lebert, have written on the connection between scrofula and consumption, have presented views of the origin of the disease, which unquestionably exist in nature. Most of the French pathologists who have either written or lectured during the last thirty years, have taught that the anatomical character of scrofula was tubercle in various textures and organs; in one more, in another less; that scrofula does not exist without tubercle, and that where tubercle exists it is a proof of the presence and operation of what has been called scrofula. Thus, scrofula of the lymphatic glands consists in the infiltration or the deposition of tubercular matter in these glands; scrofula in the bones consists in the texture of the bones being infiltrated and invaded by tubercular matter; scrofula in the joints consists in the effusion of the tubercular matter into the substance or upon the surface of the articular tissues. Tubercles and tubercular matter deposited in the brain or in the cerebral membranes, occurs only in the scrofulous, and is held to be an unequivocal proof of a scrofulous disposition; and the presence of tubercles in the lungs, upon the same principle, is inferred to depend upon the operation of the scrofulous action upon these organs. The works of Sir Robert Carsewell may be mentioned as affording the fullest proofs of this doctrine.

If it be proposed to dispute the accuracy of this generalisation, the answer must be, that all depends upon the meaning assigned to the term TUBERCLE. Probably we are too much in the habit of attaching to the term the idea of a hard irregular mass, that is, a mass more firm than the texture in which commonly it is seated, excepting the bones, and looking more to its physical and anatomical characters than to its chemical and pathological constitution, and its pathological signification. But if it be viewed merely as a product of morbid and perverted action, misnutrition as it may be called, as the product of a peculiar morbid action proceeding in the system; if the difficulty do not entirely disappear, it is at least greatly diminished. It must then be clear that the deposition of tubercles in one or more textures, and rarely is this deposition confined to one texture or to one single organ alone, is the result of a general state of the system, in which the materials of nutrition are at once not properly elaborated in the digestive organs, and after being received into the blood, instead of being applied, as healthy materials would be applied to the reparation of wasted tissues, to the building up of the different textures and organs, being in the blood in a state unfit for this application, are deposited in various parts and textures in the only form in which matter so imperfect can be deposited. Tubercular matter is, in fact, as existing in the blood, unfit for the purpose of nourishing the textures. It is an alien, as it were, and therefore cannot be, and is not, applied to the repair and maintenance of the organs. But when existing in the blood, it is necessarily deposited in one or more textures, not unfrequently in many, in some instances in all.

While, however, we submit this as the generalised result of the researches, the doctrines, and the reasonings of pathologists upon the relation between Tubercle and Scrofula, and the formation of the former, it appears not a logical or correct view to say that Tubercle is caused by Scrofula, or that scrofula, such as it is vulgarly called and defined, in the external organs, namely, the lymphatic glands, is caused by the presence of Tubercle. More consonant with the exact relation of facts, it appears to be to say, that Tubercle and Scrofula are both results or productions of the same state of the system, the same disordered or distempered constitution of the blood. The deposits in both diseases are manifestly the effect of a peculiar deranged state of the organs of nutrition, induced under various circumstances, sometimes of poor living, sometimes of disordered living, sometimes of cold and inaction, especially confinement in damp, not well-aired dwellings, but in all instances tending to produce the same product in different organs, and that product tending in various modes, and at variable rates of rapidity, to the disintegration of the textures and organs in which it is infiltrated and deposited.

A natural question here arises: Is the deposition of tubercles in the lungs attended with any marked general symptoms by which the existence of the process may be inferred, or does this infiltration or deposition take place under circumstances which prevent it from being recognised? All those who have maintained the fact of the existence of latent tubercles, that is, tubercles which cause no indications of disordered respiration or disordered general health, must maintain, or at least favour the latter belief. On the other hand, there are not wanting facts to shew that, however insidiously this disease makes its approach, yet the deposition of tubercular matter in the lungs takes place often as the effect of a peculiar chronic inflammatory process, not certainly so acute as either *bronchitis* or *pneumonia*, but, nevertheless, sufficiently well marked to shew, that the sufferer is out of health. In other instances, this deposition takes place so quickly, apparently, and under symptoms so manifest of pulmonary disorder, that we are persuaded that it is in many instances a peculiar form of inflammation, not perhaps very acute, but an inflammation affecting chiefly the pulmonary vesicles, and thus terminating by effusing within, and perhaps around them, tubercular matter sufficient to cause consolidation of considerable portions of the lungs.

It was the opinion of Joseph Frank, that tubercles in the lungs were indurated lymphatic glands; yet he added the not very consistent idea, that they were masses of induration left by previous inflammation. The first of these opinions, though entertained by Portal and Heberden, it is scarcely requisite to notice; because it is at variance with anatomical facts,—the lymphatic glands being seated around the bronchial tubes, whereas the tuberculated masses are in the substance of the lungs. Joseph Frank, however, believed, like many other physicians, that these bodies might continue latent for some time, a long time, indeed, unless excited and irritated by inflammation, either catarrhal, peripneumonic, or hemorrhagic. In these circumstances he believed that the tubercular masses were liable to be brought into an inflammatory state; and to this inflammatory state he gave the name of *Tuberculitis*.

"Morbi acuti accidentales evolutionem phthiseos scrofulosæ præparantes, sunt febres catarrhales, pleuro-pneumoniæ, et pneumonorrhagiæ. Illis enim in pulmone vigentibus status inflammatorius bronchiorum, pleuræ, et vasorum sanguiferorum ad glandulas induratas transgredi videtur, unde illarum phlogosis, cui nomen *Tuberculitidis* imponi possit. Hæc vel morbo acuto profligato remanet, ac nisi resolvatur, in suppurationem transit, *phthisin confirmatam* constituentem. Si vero tuberculitis resolvatur, æger pro hac vice periculum aufugit, atque ad pristinum statum phthiseos latentis retrograditur. Quæ retrogradatio, cum sub recta medelâ haud raro obtineatur, cavendum, ne stadium morbi confirmati præpostere proclamemus. Phthisi scrofulosa sese lente evolvente potius errori opposito locus est. Chronica enim inflammatio, qua tunc tubercula laborant, id cum inflammationibus generis scrofulosi commune habet, quod dolose et sine magno symptomatum apparatu incedit."*

We pretend not to deny that this occasionally, perhaps frequently, takes place; it would be idle and presumptuous to say in what proportion of cases. But we are also satisfied that the attack of inflammation which is here supposed to excite, irritate, and call into an active state, tubercles previously existing in the lungs, is the tubercular inflammation itself, the attack of general disorder and local inflammation, which causes, or terminates in, the infiltration and deposition of tubercular matter in the pulmonic vesicles. This is in truth the *Tuberculitis* of Joseph Frank.

This acute or subacute *Tuberculitis*, nevertheless, it must be remembered, does not take place without the concurrence or previous existence of a certain state of disordered health.

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* Praxeos Medicæ Universæ Præcepta, Auctore Josepho Frank. Partis Secundæ, Vol. Septimum, Sectio Prima. Editio Secunda. Taurini 1824, p. 127.

This has been admitted by all physicians, under various denominations;—the phthisical diathesis, the strumous diathesis, the scrofulous diathesis, or catarrhal disposition, and sometimes, as by Dr Wilson Philip and Mr Abernethy, as a deranged state of the digestive functions. But though this previous condition of disordered health has been noticed by almost all those who have treated of consumptive diseases, it was first correctly described, and placed in its proper light, by Sir James Clark, in his Treatise on Pulmonary Consumption, under the name of the Tubercular Cachexia. The clear and rational views which this author has given of this peculiar cachectic state of the system as a predisposing cause of consumption, and of the manner in which it is formed, have been of great service in elucidating the origin of consumption; and the treatise of Sir James Clark must be regarded next to that of Louis, as marking an era in the modern etiology of the disease.

Sir Charles Scudamore, following the ancient ideas, says that consumption is to be regarded as arising from the presence of tubercles in the lungs. Dr Calvert Holland, who attaches no great importance, either to pathological inquiries, or to the results of microscopical researches into the nature and morbid structure of tubercles (pp. 72, 73, 74), thinks, that unless we look to the agency and influence of the nervous system, all inquiries and speculations regarding the origin of phthisis must be useless. It is requisite, in the first instance, to look to the condition of the digestive organs and functions as the primary and generating agency in the production of phthisical symptoms (Chapter II.), as the original source of that form of deranged health which leads to consumption; and next to this, to understand rightly the influence of the nervous system, either in inducing the dyspeptic disorder, or through that, the phthisical condition. It must be observed, that it is not very clear which of the two morbid conditions the author places first; for in one part of his work he speaks of the disordered state of the nervous system as if it were the primary process; and again, he allows, that the disorder in the functions of digestion induce disorder, feebleness, and irregularity in the influence of the nervous system, and thereby, either jointly or separately, prepares the way for the approach of disease in the lungs. (XXIX, XXX). Derangement in the function of digestion, in short, springs directly out of disturbed conditions of the Nervous System. (P. 60). But whatever be the order in which the functions of these two systems become deranged, Dr Holland expresses a confident opinion upon one point, that the state of the Nervous System has been unjustly disregarded in explaining the origin of Phthisis. "In perusing attentively," he says, "the numerous Treatises that have been written on phthisis, it is remarkable how little the agency of the Nervous System is taken into account in treating of the predisposing and existing causes, and in determining the attention of remedial measures. In some of these treatises this system is disposed of in a few lines. In many no allusion to it is made." "Phthisis, that is, in its origin, is to be explained only on the disordered condition of the Nervous system." Whether the body be robust or feeble, or whatever may be its prevailing characteristics; whether the blood be superabundant or deficient; too stimulating or inadequately charged with vital properties, these different conditions are to be referred to the Nervous Agency. (P. 76).

The analysis of the several conditions attendant upon phthisis and concurring in phthisical individuals, establishes, Dr Holland maintains, one important truth,—the first of an innate constitutional weakness. The Nervous System is prone to be either unduly excited or depressed; and as this system regulates every vital action, it is easy to conceive the extraordinary liability of the system to impressions, whether from without or within, and at the same time to explain the frequent tendency of these to induce extreme structural changes in the respiratory organs.

No writer, he continues, has attempted to shew why in an individual so constituted, the prevailing disease should be Pulmonary Consumption. No conjecture of the kind exists in any work that has passed under Dr Holland's observation. Nor, indeed, was it possible to offer a rational hypothesis, without far more comprehensive views of the laws of the animal economy, than have hitherto been exhibited in the investigation of Phthisis. When the most elaborate Treatises on the Disease contain scarcely one remark on the agency of the Nervous System, and omit altogether the study of the Nervous Relations by which different organs are united to harmonious operation, it would be unreasonable to expect any well-digested speculations on the subject.

It is for these reasons that Dr Holland thinks it absolutely necessary, in considering the origin of Pulmonary Consumption, and the circumstances under which it is most liable and even certain to be produced, to devote special attention to the Nervous System and its influence. He reminds the reader that the human body presents two immense surfaces; the

CUTANEOUS, AND THE INTERNAL OR MUCOUS SURFACE, REPRESENTED BY THE WHOLE OF THE VISCERA; these two surfaces are in intimate association, and during life reciprocally influence each other,

The next point which Dr Holland regards it as important to establish, in giving a rational etiology of Pulmonary Consumption is; that EVERY DISEASE IS A DERANGEMENT OF THE RELATIONS OF THESE SURFACES, AND VARIES WITH EVERY MODIFICATION OF MORBID ACTION.

He then remarks, that in all aggravated chronic affections, which are characterised by diminished vital action, the blood is gradually withdrawn from the extremities and surface of the body, and is accumulated either in the internal viscera generally, or in the organ diseased. This arises from the combined influence of two causes; namely, the deteriorated properties of the vital current, and the want of power in the heart and its associated vessels to maintain the requisite circulation. The proximate cause, however, or that to which all the effects are to be traced, is THE ALTERED CONDITION OF THE NERVOUS SYSTEM, WHICH ALONE REGULATES THE FUNCTIONS OF LIFE.

So far as we understand the application of these propositions, in the subsequent paragraphs, Dr Holland leaves it to be inferred, for he does not exactly state the inference, or shew how it follows, that the formation and development of Phthisis arises from this subverted balance of nervous action and circulation in the two great surfaces; the accumulation of blood in the internal organs and its abstraction from the extremities and surface. In proof of all this, he adds, the usual symptoms of the early stage; the cold extremities, the occasional chillness, numbness of the fingers without adequate cause; irregular action of the bowels; perceptible loss of flesh, sharpness in the features, and diminution of the figure in the instance of females, all point to one condition, namely, subversion in the balance of the circulation.

The only objection to this hypothesis is, that the condition inferred is not peculiar to the incipient stage of Phthisis, but is common to many diseases, especially where there is disorganization of any internal organ.

The author appears to be aware that some intermediate and appropriate link is wanting between the premises and the conclusion; for in the next paragraph (xlix., p. 84), after some observations on the effects of friction in restoring the lost balance of circulation, the following remark is added,—"Whatever view be taken of the origin or nature of Phthisis, it will be admitted that it is a disease which not only gradually exhausts the energies of the system, but induces those morbid conditions both in the respiratory and other organs, which advance at the expense of the circulating fluid."

This is undoubtedly true. But of what serious disease in an internal organ may it not be said that it advances, and increases at the expense of the circulating fluid. Such, at least is the case with disease of the liver, disease of the kidney, disease of the uterus, disease of the bowels; even diseases of the bones and joints all advance at the expense of the circulating fluid.

Dr Holland then states, that Phthisis must not be regarded simply as an affection of the lungs. It may appear to have a special locality. Its principal seat he allows to be unquestionably in the chest; but in order that the measures to be employed in its treatment should be successful, they must have a reference to the whole animal economy. The digestive apparatus, the functions of secretion, absorption and nutrition are invariably disordered, and not merely as consequences proceeding from the morbid conditions of the lungs, but arising from the derangement of the system in which Phthisis itself originates. (P. 84, 85.)

Dr Holland then proceeds to explain the particular circumstances, why the lungs, in persons possessing the consumptive predisposition, should be especially liable to structural changes. Though changes in temperature are the main agent in subverting the balance of the circulation, he justly adds, that as a general cause of this kind ought to act generally upon all the internal organs, it remains to be ascertained what are the particular circumstances which determine the lesion particularly to the lungs. The character of the subverted balance, the direction which it takes to any one organ more than another, varies with the structure and the functions which each has to perform.

The stomach, the intestines, the liver, and the kidneys are secreting organs, that is they are the seat of all the secretion of fluid which is peculiar to each;—gastric juice, intestinal fluid, bile, urine. When the action of any one of these is either excited or depressed by external causes, the result is a modification in the amount and quality of the fluid secreted. When, therefore, from any of these causes, the circulation in these organs is disordered, it is shewn by the change in the amount and quantity of the secreted fluid; and for relieving themselves of this, these organs all possess peculiar facilities.

The lungs, on the other hand, discharge a gas or vapour; and when their circulation or that of their lining membrane is disordered, they possess not the same facilities of self-relief and adjustment. The air may not exert upon the blood a proper oxidating power; less carbonic acid may be eliminated; but the lungs themselves possess no facility of correcting what is hurtful, beyond the ordinary phenomena of catarrh or some similar action. The lungs also are highly vascular; and contain, or at least are the means of conveying through their substance a much greater quantity of blood in proportion to the structure through which it circulates, than any other part of the body, excepting only the arterial and venous system viewed collectively.

The blood is further distributed through extremely minute vessels, ramifying on the delicately formed air-cells, for the purpose of exposing the largest possible body of it to the action of the inspired air, as well as for the emission of matters no longer required by, or that might, if retained, be injurious to the system.

While these two objects constitute the function of the lungs; and while with the inspiration of oxygen and nitrogen, watery vapour and carbonic acid are discharged; if from the operation of external agents the vessels of any portion of the lungs become congested, or otherwise disordered, the lungs have not the same means as those which the stomach, bowels, the liver, or the kidneys possess, for relieving themselves of the cause or causes by which they are oppressed. They have not the same means of correcting what may be hurtful in the effects of morbid and perverted states of their circulating system, which are possessed and put in use by those organs which open on free surfaces communicating readily with the external outlets of the body. Dr Holland argues, therefore, that this condition, by diminishing the chemical changes which the blood should undergo, will place this fluid under unfavourable circumstances for the free and perfect action of the inspired air, which is essential to the interchange of the gaseous elements. These vessels, therefore, he infers, will lose in the ratio of their degree of derangement, the power of relieving themselves by any modification of their condition.—(P. 90.)

Dr Holland asks whether these views do not afford, for the first time, a rational explanation of the tendency of the lungs to structural changes in persons predisposed to consumption. This question we do not presume to answer. We state the facts accurately; but our readers can answer for themselves.

Dr Holland directs attention to the fact, or at least the presumption, of the impurities of the blood in such circumstances, circulating in the minute capillaries of the membrane of the air-cells, the effects of improper food in such circumstances, of imperfect digestion, and depression of the nervous system; from all which he thinks stagnation at different points of the pulmonary tissue may take place and become the nucleus of extensive disease.

If we suppose the blood, the author continues, or its imperfectly elaborated elements, to become stagnant in the manner now pointed out, in various situations of the pulmonary capillaries, though at first forming mere isolated points, the matter thus arrested in its course, would be deficient in the ordinary properties of vitality, and would be withdrawn from the influence of the nervous energy, essential to constitute it a part of the living system. It would therefore become an inorganic substance, and would act as a foreign body in the tissue in which it is present. For its subsequent enlargement and change of condition, the author thinks it easy to account. Once deposited, while the constitution continues in the same state of predisposition, and the other circumstances remain unchanged, the substance or the process must, he says, inevitably advance. It will impede the circulation in the adjoining capillaries, and in proportion to its influence in this respect, it will accelerate the deposition of similar matter. In this manner the mere miliary or small grain-like tubercle will become an extensive mass of disease; the pulmonary tissue being either broken down or converted into a fluid of pulpy consistency. It is in this stage, according to Dr Holland, that the expectoration exhibits the properties of pus, which escapes through the bronchial ramifications, which are in connection with the source of disease. The whole of the matter has not this origin. The greater part of the mucous membrane lining the air-tubes, sympathizes with the existing local mischief, and adds largely to the sputa its own disordered secretions.

The statements now made may be regarded as presenting the hypothesis of the nature and formation of that state of the lungs, which constitute consumption, as given by Dr Holland.

According to Dr Cotton, the term Phthisis is at present universally and exclusively applied to a peculiar and obscure condition of the whole system, in which the materials required for the growth and reparation of the body are imperfectly supplied by the process of nutrition; while the elements of a morbid substance, finding their way into the blood are deposited in the form of *Tubercle* in certain internal organs, chiefly the lungs, ultimately causing their destruction and death. This state of the system, he further allows to be exactly identical with that known by every one as Struma or Scrofula. Phthisis and Scrofula indeed he allows to be merely varieties in development of the same malady; the difference between them depending upon the Tubercular substance being, in the one case, principally deposited in certain internal and highly vital organs; but in the other, more generally in glandular and superficial textures, the soundness of which is less essential to the functions of life.

Dr Cotton subsequently explains the distinction between Phthisis and Tubercle in the following manner. The term *Phthisis* is only applicable to that peculiar condition of the whole system which involves, among other consequences, a tubercular state of some of the internal organs. Tubercle, on the other hand, expresses the effect of such a condition; the one being related to the other in exactly the same way that saccharine matter is to Diabetes, and lithate of soda to Gout.

This distinction ought to be kept in view not only in the beginning of Consumption, but during the whole course of the disease. In the first stage, Dr Cotton remarks, of Consumption, the lungs are not necessarily tubercular; but they become so as the effect of the phthisical process. The truly consumptive symptoms are never dependent upon the amount and the condition of the tubercular deposit, but upon the degree of functional disorder under which that deposit has been produced or altered. The proof of this, the author thinks, is furnished by the fact, that cases often present themselves, in which though the tubercle is not hitherto softened, Consumption is more marked, and life apparently more threatened, than in other cases in which the pulmonary structures are broken down into cavities. The one unquestionably reacts upon and aggravates the other; yet it is, in truth, Dr Cotton maintains, the Phthisis and not the Tubercle which destroys life. The latter would, in most instances, he adds, either be expelled or become innocuous, providing we could apply to the other a timely and effective remedy.

Without positively calling in question the correctness and the justice of the distinction here made, it may be doubted how far it is correct to say, that the Phthisis as above defined, exclusive of the Tubercles, destroys life. It is surely to be allowed that the extensive occupation of the lungs, whatever be its cause, by tubercular masses, interferes in a most important manner with that function, the function of respiration, which is so essential not only to the continuance of life, but to the integrity of all the other functions. It is surely not to be denied, that when the lungs are extensively destroyed by the breaking down of these masses, and by the substitution of *Vomicæ* and Cavities in their place, the function of respiration is not only very seriously impaired, but must speedily become so inadequate, as of itself to cause the cessation of life. Even the expulsion of tubercular matter is a process very destructive of respiration and its purposes, and consequently tending directly to the abridgment of life. As to tubercular matter being or becoming innocuous, if it do so in the external textures, it has not, unless in exceptional cases, been known to become so either in the lungs, the intestinal tube, or in the brain. Invariably in these textures it destroys all around it. It must be allowed, that in the attached condition there is great virtue. If we could apply to the Phthisical process or action, whatever that may be, a timely and effective remedy, implies certainly a great deal;—more probably than can yet be said to have been accomplished by any of the usual resources of medicine. If, however, the ideas or the nature and causes of the incipient process lead to any practical results, it is that in the early stage the morbid action may finally be arrested, and all the destructive effects which subsequently follow that action, may be prevented from taking place. In the meantime, nevertheless, whatever be the cause, whether, as Morton remarked, it be from unwillingness, on the early appearance of the symptoms, to apply to physicians, or from other causes, which it is unnecessary to specify, it rarely happens, that the physician has it in his power to apply means to check the very first beginnings of the disease, and almost never, that he has it in his power, to employ prophylactic means to prevent the development of the disease in the persons of those, in whom it may be apprehended to be about to take place.

To us it appears quite indispensable, absolutely necessary, to admit at once, in the present state of knowledge, the fact, that tubercular deposits in the internal organs naturally produce so much disintegration and destruction of tissue, that it is not at all rational to say, either that these deposits are innocuous, or that by any known means the disintegrating processes which they induce, can be arrested, or the parts so destroyed can be restored. We attach no importance, we never did attach importance, to the notion of the mode of cure adopted by Laennec, and which either of itself or in a modified shape, forms so large a proportion of the basis of modern theories on the cure of Consumption. The state described by Laennec is not a cure; bears no resemblance to a cure. It is merely a residue and consequence of a process of disintegration, which from particular circumstances has fallen, before the death of the patient, into a state of cessation and inaction. It is also an exceptional effect, and takes place only in an infinitely small number of cases. What is as much to the purpose, these supposed traces of healed tubercular cavities are always liable to become the seat of renewed inflammation and further disintegration, and in one of these attacks to carry off the patient with rapidity.

It is further to be observed, that not a few of the hardened spots and cicatrices pointed out of late years on the surface of the lungs, as indicating the situation and presence of healed vomicæ, are in truth not the effects of tubercular vomicæ, but merely of common attacks of peripneumony, which had become circumscribed, and which had not been sufficiently extensive to impair the function of the lungs to a very hurtful or fatal extent.

It may, nevertheless, and ought to become a just subject of inquiry, whether by more careful study of the origin and etiology of Phthisis, whether by more profound acquaintance with the generating causes of tubercle, we can be put in possession of means which may tend to prevent the formation of a substance, the disintegrating effects of which are so powerful and certain. It has been already seen what is the hypothesis of the formation and origin of Tubercle proposed by Dr Holland. We have yet to see what degree of light the representations of Dr Cotton and Mr Ancell throw upon this subject.

According to Dr Cotton, Tubercular matter is formed in two modes; first, by a gradual and uninflammatory process of separation from the blood; and secondly, by inflammatory action ending in a morbid scrofulous secretion instead of a healthy fibrinous one. The first is by far the most common, in short, the ordinary mode of the production of Tubercle, as is seen in the large proportion of cases in which the disease makes its approach in an insidious and gradual manner; unattended at its commencement by any conspicuous thoracic symptoms. The second he thinks is comparatively rare, and is seen in those cases in which pneumonia, pleuro-pneumonia and bronchitis, either from neglect or by phthisical predisposition become obstinate and chronic, and finally pass into confirmed phthisis. That Tubercle is not necessarily of inflammatory origin, he thinks, is shewn by the fact, that not only are the signs of pneumonia of rare occurrence during the early period of Phthisis, but the pulmonary structure which surrounds Tubercle of recent formation rarely presents any appearance of inflammation, the lung though more or less congested, being almost invariably crepitant and buoyant in water. He allows that, after Tubercle has existed for some time the parts immediately surrounding it are often hard and thickened; but this again, he argues, is the result of secondary inflammation, or of a process designed with a special object, to be afterwards explained.

Tubercles may remain in the miliary or granular form, in which they are first deposited, for almost any length of time, according to Dr Cotton,—even during a long life. But more generally, within a limited space of time, they increase in number, and are converted into a yellow, or yellowish-white, homogeneous, dull, cheesy-looking material, known by the name of crude tubercle. This is ultimately transformed into calcareous matter, or it is broken up into a soft purulent or flaky substance, intermixed with fluid.

The calcareous matter, he thinks, arises either from the simple absorption of the animal matter which had existed in the tubercle, while the earthy constituents continue, or it depends upon a process identical with ordinary petrifaction, in which each organic molecule, as it is removed, is exactly replaced by a calcareous one; so that the chalky substance ultimately acquires the exact form of the original tubercle. Carbonate, with a small proportion of phosphate of lime, a salt of soda, and animal matter, constituted all the specimens examined by Dr Cotton; but he allows that their chemical characters may vary,

When the deposition of tubercular matter originates in an inflammatory attack, the course is different, and much more rapid. The stage of gray granulation is then very short, or entirely wanting; the product of inflammation is from the first of a low kind, allied to, if not identical with, crude Tubercle, or rapidly becomes so; and the calcareous transformation seldom if ever takes place.

The microscopical examination of Tubercle has led to considerable discordance among observers as to its structure. On one point only all seem agreed, namely, that it is void of bloodvessels, and every other trace of organization. Lebert describes peculiar cells, which he regards as characteristic of tubercular products. Gerber distinguishes tubercle into different forms, according to the supposed amount of vitality; inorganized or granular tubercle; cytoblast tubercle; cell tubercle; and filamentous tubercle;—each being one move higher than the other in the scale of organisation. Vogel describes Tubercle as consisting of three elements; namely, amorphous stroma, granules, and cells; all of which vary in their respective proportions in individual cases. Mr Simon denies the existence of cells in tubercular deposits, and thinks them unessential to its composition. Gruby describes very large cells as its characteristic constituent. All, in short, differ from each other.

Dr Cotton thinks that the explanation of all this discordance is to be found in the circumstance that Tubercle is not always of the same structure. It differs according to the degree of Phthisis under which it is generated; and it may differ in the same case according to the particular organ in which it is produced.

Another conclusion, it appears to us, results rather directly from the discordance now noticed. This is, that microscopical observation is entirely useless in distinguishing the peculiar character of this structure.

Dr Cotton gives the following description, as we understand, from personal observation.

Miliary Tubercle from the lungs consists of a dense mass of imperfect cell-nuclei and ruptured cells, thickly studded with granules, through which are distributed a few oil-globules, elongated fibres, and black matter identical with the ordinary carbonaceous manner common in the lungs. In these materials Dr Cotton never observed Tubercle, after examining in many different cases, to be deficient. But they are associated in variable proportions, according to the amount of vitality in the tubercular mass,—that is, according to the degree of Phthisis by which they are produced. The closer the Tubercle approaches to living structures, the more numerous and perfect will be its cells. The cells themselves are generally so broken down and irregular, that they can scarcely be said to have any definite shape. But when sufficiently perfect to be examined, they are of various sizes, irregular in shape, and void of nuclei. The fibres do not interlace, but are irregularly scattered, and appear to be derived from the surrounding tissues rather than as an essential constituent of the tubercular mass.

The proper definition of Tubercle would be, according to Dr Cotton, that it is a mass of dead and dying cells and abortive cytoblasts,—an attempt at reproduction ending in the formation of a cell-mass, of different degrees of vitality in different cases, and sometimes also of different structure in different organs, but incapable of long resisting the chemical and physical changes to which unorganised bodies are liable.

It is impossible to avoid remarking that here there is a little inconsistency. Tubercles are allowed, by most pathologists, to be unorganised bodies; yet here are assigned to them degrees of vitality. It appears to us that it would not be difficult to shew that they possess no vitality whatever.

A substance may be the product of vital action, which, however, possesses no vital power or property itself.

As Tubercle advances in its stages of transition, the minute structure becomes modified. The yellow or crude Tubercle is composed of granular matter, and an increased number of oil-globules, with which may be interspersed a few remains of cell-growth in the shape of broken cell-walls and cytoblasts.

Softened Tubercle is merely an intensely granular mass intermixed with oil-globules; and its dark granular appearance may be detected in examining more especially the sputa of consumptive patients.

The conversion of miliary into yellow Tubercle, and the process of tubercular softening, is effected,—according to Dr Cotton,—chiefly by the conversion of albuminous into oily matters, or by fatty degeneration.

On the subject of the results of chemical analysis nothing distinct is communicated. It will subsequently appear, indeed, that chemical analysis has thrown no distinct light on the nature and character of Tubercle.

It is scarcely necessary here to repeat all that has been said on the exact site of tubercle in the lungs. It is well known that the deposit occupies, in general, first and preferably the upper lobes of the lungs. As to the comparative affection of each lung, the degree of occupation varies in different stages of the disease. From a table of numbers collected by the author from one thousand cases, it appears that the left lung is more frequently affected than the right, in the ratio of 455 to 384; that in the early stage, the right lung and the left lung are affected nearly in equal degrees in the male sex, but in females the left lung, more frequently than the right, in the ratio of 146 to 112; that in the second stage, the left lung is more frequently affected in males than in females, in the proportion of 40 to 29; that in the third stage, the left lung still shews a greater frequency of affection, though the numbers in the two sexes are not very widely different. The general result is, that the left lung is more frequently affected by Tubercle than the right. But ti is manifest that no useful conclusion can be derived from observations of this kind; and all that they shew is, that the disease, in general, commences in the left lung.

As to the exact tissue of the lung in which the tubercular matter is deposited, nothing precise is stated. It is, indeed, clear, from the observations given by Lebert himself in the sixty-ninth and seventieth volumes of this Journal, that nothing positive has been ascertained.

The account which Mr Ancell gives of *Tuberculosis,*—a term for the use of which we refer to the sixty-ninth volume of this Journal, at page 308,—is lengthened, detailed, and instructive. The author begins with examining the state of the blood in *Tuberculosis,* in which, after Sir Robert Carswell, and other pathologists, he finds the original germinating cause of the disease.

Mr Ancell infers, from considering the analysis given by various chemists, Dr Fricke, Andral, and Gavarret, and Dr Glover, first, that the blood in Tuberculosis is deficient in the proportion of red globules; secondly, that the albumen is augmented in quantity, but imperfectly developed and defective in quality; thirdly, that there is an excess of fibrine, but that this principle also is defective in its nature; fourthly, that the watery part of the blood is increased in proportion to the solid constituents; fifthly, that it is not ascertained whether the fatty principle is diminished; and in the sixth place, that nothing very satisfactory is ascertained as to the increase or diminution of the saline principles. A general view of the changes in all these elements and principles in Tuberculosis, the author attempts to give in the following diagram.

TUBERCULOUS BLOOD, Defective in vital properties; the essential nature of the defect unknown.	RED CORPUSCLES. Deficient in number. Deficient in structure.	Globulin *deficient.* Haematin *deficient.* Iron *deficient.*
	LIQUOR SANGUINIS. Vitiated in quality.	Water in *excess.* Albumen; *in excess, but defective in quality.* Fibrine; *rather below than above the standard; defective in quality.* Fats; *probably deficient.* Colouring matters *modified.* Alkaline salts *deficient.* Earthy salts *deficient?* Lime in *excess?*
	WHITE CORPUSCLES?	

It thus appears that after great chemical research, much is doubtful and uncertain; if not positively in a state of confusion. Mr Ancell nevertheless thinks, that the most general character of the blood in *Tuberculosis* is diminished vitality, and that in reference to the diminished amount of the red globules, Tuberculosis may be called a Consumption of the Blood. The blood, he thinks, possesses, in the healthy state, a certain degree and amount of vitality. This amount of vitality is denoted by its dynamic properties of endosmose and exosmose in the corpuscles, by its organic contractility, by its power of assimilating old and new matter to the form of the blood, by its power of forming red corpuscles and *liquor sanguinis*, the consumption of red corpuscles, and the waste of *liquor sanguinis* in nutrition. When the sum of these physiological actions, says Mr Ancell, is within the physiological range, and they are in harmony with each other, a sufficient number of corpuscles being formed and wasted, and all the constituents of the *liquor sanguinis* being complete and proportionate, and renovated according to the requirements of the different tissues, the blood possesses the healthy degree of vitality. In Tuberculosis, on the other hand, the sum of these actions is below the physiological range; moreover, the proportions of the constituents of the blood are subverted, and their qualities are deranged. This denotes a low degree of vitality, which is consistent with all the phenomena of the tuberculous predisposition, and with the signs of *Tuberculosis* in its various forms.

Mr Ancell next takes a view of the state of the Fluids, which supply the blood with the materials for its renovation; of the state of the blastema in the tuberculous predisposition; the structural characteristics of the tuberculous predisposition; the functional characteristics of the tuberculous predisposition; and closes the first chapter with a general summary of the state of the constitution in the Tuberculous predisposition.

As we believe that this summary will convey to our readers a more just view of the general inferences at which the author arrives, than any abstract which we could offer, it seems most eligible to place it before our readers.

> "The facts shew that, where the blood is of that peculiar character already described, and designated 'tuberculous,' there is a disturbance in the development and an irregularity in the form of different parts of the body, particularly of those which have cell-growth for their basis. The whole or even the majority of the peculiarities of structure and function are by no means present in every individual affected; sometimes a few only are to be observed, and there are none which may be said to be constant. Even the malformations of the osseous system are not so general as has sometimes been thought. Fournet found about one-third of the phthisical patients had a well-

formed chest.[1] In one case, the dilated pupil and smooth and almost transparent skin are the only outward signs of the predisposition; in another, the malnutrition and irregular development of the osseous system have proceeded so far, that the case borders on rickets, and there is but little deviation from the normal condition of the other parts; in another case, the tumid abdomen is observable, and there are signs which indicate a predisposition to disease in this region; in another, the malformation of the chest is the peculiar characteristic. A particular group of these signs is designated by Hufeland as '*The Scrofulous Physiognomy*;"[2] another group is described by other observers as the '*Consumptive Habit*.' In the present state of science, it is impossible to explain why a tumid upper lip in one instance, an elongated maxilla, or an enlarged and projecting *os frontis* in another, is developed from tuberculous blood. Pathology is only on a par with physiology in this respect, since it is impossible to explain the innumerable variations of form and proportion among healthy individuals; why the blastema derived from healthy blood develops great muscularity in one case, and obesity in another; or why one person has an aquiline and another a Roman nose. To comprehend the causes of these phenomena, presupposes, not only a knowledge of the composition and chemico-vital molecular actions and metamorphoses of the blood and blastema, but also of the laws of cell-growth and organisation, including those laws which determine the formation, elongation, splitting,[3] transformation, the occurrence of secondary deposits, &c., of cells, in the construction of tissues and organs,—a knowledge far beyond that which we at present possess. The modifications of cell-growth and organic development are frequently, particularly in the slighter cases, progressive from birth to mature age, at which time the individual presents, more or less completely formed, the tuberculous frame and general constitution.

" The specialty of the tuberculous constitution has been described, at one time, as an 'arrest;' at another, as a 'retardation;' and again, as a 'retrogradation' of development; but either of these terms is manifestly inadequate to define the nature of the peculiarities. It is true that, in the early infancy of individuals whose blood is tuberculous, the general frame is sometimes large, but, at the snme time, thin,—that it wants the firmness of health,—and, as growth increases, it is found that the structures are late in attaining perfection, and the body is not well-proportioned,—there is a want of symmetry,—or it sometimes assumes a remarkably slender form,—imperfect formations, which have been referred to by several writers as illustrating the principle of an arrest of development. It is true, also, as urged by Dr Addison,[1] that a retrogradation of structure in the mucous, serous, and fibrous tissues is exhibited in the tuberculous constitution—that 'fibrous recedes into mucous, or both into cellular tissue,' and that the cell organisms themselves retrograde into their embryotic condition; but all the facts cannot be explained upon that principle alone. The abdomen being prominent, the head large, the liver also large, and the extremities small, certainly correspond with the state of the fœtus, in these respects, at the seventh month of uterine existence; but the multiform variations already described cannot be accounted for in a similar manner. There exist a depravation of nutrition and an aberration of development, beyond a mere interruption to the ordinary physiological processes. The blood being tuberculous no doubt gives rise to an arrest of development; but it is not in its origin and essence an arrest of the development of organs and structures in their aggregate, but an aberration of nutrition in some, and frequently in several of their component parts; and although the tissues and organs may in all respects be regularly and fully developed, a tuberculous state of the blood may produce malnutrition, without the absolute supervention of general or local disease, at any period subsequently. It has been correctly pointed out, that this specialty of the organisation consists of a modification in the *detail* of the structure of parts, as well as of the proper forms of tissues and organs.

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[1] Recherches Cliniques. Paris, 1839. Vol. ii., p. 405.

[2] Traité de la Maladie Scrophuleuse—Traduit par I. B. Bousquet, 1821, p. 86.

[3] Carpenter's " Principles of General Physiology." Par. 159.

"This constitution manifests itself in every degree. In some individuals it is so decided from birth, that, sooner or later, and sometimes at a very early period of life, tuberculosis, as a necessarily fatal disease, occurs spontaneously. In others it is so slight and delicate that it is difficult to define it in words,[2] and the continued action of those causes which are capable of producing a tuberculous condition of the blood is required to produce its pathological results. In those individuals in whom it is manifested in the slighter degree, the susceptibility of the whole system to rapid change from a healthy to a valetudinary appearance, and the converse, is sometimes very remarkable. When the blood is tuberculous, the florid complexion and the appearance of a full habit easily pass away under the influence of fatigue, privation, and disease; and when these causes cease to operate, and their opposites are in play, the blood recovers its normal constitution, and health is rapidly restored. It is always a most suspicious circumstance when we witness a young person becoming cachectic in a particular locality, as in a large town, or under particular habits of life, exhibiting a pallid face, with the functions of life languid, but recovering (on removal to the country or the seaside), in a very short time, a florid hue with health and spirits, and then again rapidly declining—sometimes visibly relapsing in a week or ten days on return to town. This indicates a want of stability in the composition of the blood. When such subjects reside in towns, and take little exercise, they frequently become plump and rounded, not from an increase of muscle, or a deposition of healthy fat, but from that low state of hypertrophy and super-infiltration of the areolar tissue, which has been already noticed, and is indicated by the roundness and plumpness very rapidly receding on the occasion of any slight indisposition, or unusual mental or bodily exertion.

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[1] "On Healthy and Diseased Structure; or, the True Principles of Treatment for the Cure of Disease, especially Consumption and Scrofula." 1849.

[2] Dr Tyler Smith on Scrofula, 1844, p. 19.

"The tuberculous condition of the fluids and solids, even in the degree indicated by the expression, 'the tuberculous predisposition,' becomes a real predisposing cause of numerous diseases. Of these a state of dyspepsia, beyond those slighter shades of functional disturbance already described as contributing to form the predisposition, is amongst the most remarkable. Dyspepsia is so constant an attendant, and presents such marked symptoms, that it has been called 'strumous dyspepsia,' and is considered, by Dr Todd and others, as a more characteristic feature than any physiognomical portrait that has hitherto been drawn. In its slighter and more evanescent forms it may be characterised by acidity, flatulence, irregularity in the action of the bowels, spasms, colic, or worms. It is said to be so constantly present, preceding and accompanying the symptoms of tuberculosis, whatever variety or form it takes, as to rank as the cause of the disease. It will be hereafter seen, that the defective hæmatosis cannot be attributed to dyspepsia alone as a cause, but all experience confirms the facts; and there can be no surprise that, the fluids essential to digestion, in all its stages, being secreted from blood constituted as that of tuberculous subjects is, with the defective organisation of the mucous and muscular coats of the alimentary canal, should render the digestion habitually feeble, and that dyspepsia should prove an important link in that chain of morbid actions which too frequently leads to a fatal result.

"Among the affections to which tuberculous subjects are predisposed, the symptoms and history of which are influenced and more or less obviously explained by the peculiar state of the blood, and by the structural and functional modifications which constitute one or more of the varieties of the tuberculous habit, may be enumerated:—Cold indolent abscesses in the loose cellular structure, especially of the limbs, their particular symptoms and history depending upon the imperfect organisation of the cellular basis and the tuberculous qualities of the blood; catarrhal affections, particularly colds in the head, attributable to the malnutrition of the mucous membranes, their proneness to mucous discharges, their irritability, and their tendency to congestion, which render them liable to be long-continued and attended with copious secretion; also exemplified in the tendency to leucorrhœa in females, and to hæmorrhoids in either sex; diarrhœa, with large alvine discharges, resulting from slight causes of irritation; hæmorrhages, as epistaxis and effusions of blood from the trachea, bronchiæ, urethra, and alimentary canal, arising, either with or without the rupture, from the tenuity of the vessels and the diminished vitality and plasticity of the blood. Chronic glandular affections, invading the cervical, axillary, inguinal, or mesenteric glands; the lymphatic glands having a great tendency to enlarge from slight irritations of the mucous membranes or the skin; chronic affections of the thyroid gland; chronic inflammatory affections of the eyes, eyelids, and ears; frequently occurring hordeolæ; chronic lippitudo or blear-eyedness; chronic conjunctivitis and chronic hydrocephalus, &c. Also chronic congestions of the lining membrane of the internal fauces, with enlargement of the tonsils.

" The defective organisation of the skin explains its liability, from the slightest friction, to extending and troublesome eruptions; and a similarity of organisation, both in the mucous and cutaneous tissues, explains the liability to a running at the nostrils, the fluid, from the ill-conditioned blood assuming an acrid and corroding nature, excoriating the parts it comes in contact with, and producing ulcers which become covered with yellow crusts, concealing languid and pale or livid granulations; the extremity of the nose and the upper lip swelling by the extension of the irritation. This state of things is often associated with one or two other well-marked signs of tuberculosis, as glandular swellings, an elongated lower maxilla, or an augmented development of the hands in proportion to the trunk; the whole, according to their combinations, constituting different varieties of the scrofulous physiognomy, and to be accounted for only by the tuberculous state of the blood. This condition of the skin also constitutes the predisposition to numerous more definite cutaneous eruptions, which will be described in a future chapter.

" A tuberculous state of the blood operates also as a predisposing cause of inflammation of the serous membranes, with specific symptoms. Hence, inflammation of the synovial membranes of the joints, —the tuberculous meningitis, as described by Dr Hennis Green,[1]— the tuberculous pericarditis, as described by Dr George Burrows,[2]— and the tuberculous peritonitis, as described by Sir H. Marsh,[3]— either of which may occur in the predisposed without the deposition of tubercle, as well as in tuberculosis, in consequence of the deposition of tubercle; also of chronic osteitis, caries, and necrosis, resulting from the peculiar organisation of bone,—chilblains, attributable to the languor of the circulation of the extremities, the state of the capillaries, and the specific qualities of the congested blood. Finally, — in illustration of the real predispositions established by a tuberculous state of the blood,—where the morbid irritation has invaded the nervous substance, or its cellular envelopes, the nervous structures become liable to chronic congestions, inflammations, and effusions; and epilepsy, insanity, and other neuroses may be classed in the category of the affections to which tuberculous subjects are predisposed.

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[1] Medico-Chirurgical Transactions, vol. xxv., p. 192. [2] Ibid., 1847, p. 77.

[3] The Dublin Journal of Medical Science, March 1843.

" In a tuberculous state of the blood, the constitution is prone to feverish attacks from irregularity of diet, exposure to cold and moisture, and from other very slight causes. The above facts shew that a general ulcerous diathesis prevails, from which it is evident that absorption very constantly predominates over the other nutritive processes, owing to the diminished vital power or momentum of vital force in the various tissues, and the poverty of the blood, which renders it more apt to receive than to part with the elements of nutrition. This ulcerous diathesis is frequently exemplified by ulcerations of the cornea, and of the articular cartilages. There is a tendency to excessive and unhealthy or spurious suppuration, which tendency is in relation to the vitiated quality of the liquor sanguinis; and the low vitality of the solids and fluids generally is favourable to the development of intestinal worms and other parasites.

" Tuberculosis, as a blood disease, has not only a train of local and general affections to which it constitutes a powerful predisposition, many of which affections are in a great measure peculiar to itself, but it has a remarkable influence in modifying the symptoms, progress, and termination of most of the diseases to which the human frame is liable, and the effects of most of the remedies employed for the relief of those diseases. Inflammation in a healthy state of the blood differs very materially from inflammation in a tuberculous state of the blood, and its characters are still further modified where the structures have been nourished and sustained by tuberculous blood. It has a chronic and asthenic tendency, easily understood when we consider the low vitality of the blood, the diminished heat-producing power, the small proportion of corpuscles, and the vitiated liquor sanguinis. In healthy inflammation, cytoblasts, or the germs of cells, form or make their appearance very rapidly in the blastema or exudation. In the exudation of tuberculous blood they do not appear so quickly. The exudation is not so genuine a *liquor puris;* that is to say, the cytoblasts, if formed, or exuded, are not so readily formed into pus globules. The fluid effused during inflammation, when the blood is tuberculous, has, again, far less tendency to form new fibre. Whatever may be the mode in which fibre is produced, there can be little doubt that the vitiated blastema poured out by the degraded liquor sanguinis accounts for the fact; and this consequence of the morbid state of the blood frequently renders the products of inflammation inorganisable where they ought to be organisable; as well remarked by John Hunter, there is frequently in the scrofulous constitution no adhesive inflammation.[1] So, also, by considering the qualities of the blood in the tuberculous predisposition, it is easy to understand, that it is one thing to extract blood, even in diseases requiring depletion, from an individual in whose blood, in his ordinary state of health, the usual proportions of fibrine and red corpuscles exist, and another to perform the same operation where the blood is deficient in red corpuscles and fibrine, and vitiated in its albuminous principle. The modifications of the action of remedies are also exhibited very frequently in the application of blisters, leeches, setons, and even venesection, the injuries from which are sometimes slow to heal, or liable to unhealthy suppuration, or followed by eruptions of pustules in the surrounding skin. The bleeding from leech-bites is apt to be excessive, and with difficulty restrained. Membranous inflammation is prone to run into purulent discharge, as from the ears, nose, eyes, and vagina. Ophthalmia, in whatever structure it be seated, differs greatly in tuberculous subjects from ophthalmia in healthy subjects. Again, fractures are slow to unite. A wound, or a stump after amputation, affords a modified secretion when the blood of the subject is tuberculous; stumps have been described as secreting distinct curdy matter at the second dressing. Fevers, particularly those of the eruptive order, fluxes, lues venerea, in fact, all diseases, are more or less influenced in their symptoms, progress, and termination; and frequently, when in their essential nature mild and salutary, owing to the peculiar condition of the blood and tissues in the tuberculous constitution, these become obstinate and fatal.

" Thus, the tuberculous predisposition acts as a predisposing cause of a long catalogue of affections, and very essentially modifies almost all other diseases. In this point of view its importance could not be overrated. But tuberculosis is an idiopathic disease, *sui generis*, and no principle in medicine is better established than that the different varieties of this, the most fatal of all diseases that afflict mankind, present themselves most frequently in individuals of the constitution here described. As remarked by Andral, both in the old and the young, the development of tubercle in various organs, and in several organs at once, most frequently occurs in those who present the characteristics of the predisposition ; and the development of tubercles is most abundant and most general where, from this constitution being most distinctly marked, we have reason to regard the blood as in the highest degree tuberculous. It is this direct tendency to favour the development of tuberculosis and the deposition of tubercle that we have especially to investigate as we proceed.

From all that has preceded, the tuberculous predisposition is not a mere aptitude to be more easily affected by the causes of tuberculosis. Short of actual disease, it is an abnormal state of the constitution, both in its solid and fluid constituents, and in its vital power, of the same nature as tuberculosis. Where the predisposition ends, and where tuberculosis as a disease begins, it is most difficult, if not impossible to define. Here, as in many other instances, nature operates by transitions; frequently there is no clear line of demarcation. Nor does the predisposition necessarily pass into disease. Many have been deemed consumptive throughout life from having exhibited this constitution in a well-marked form, and have nevertheless attained longevity, and died from some other malady. It by no means follows from this circumstance, that their blood was never tuberculous, and that they were never subjects of the predisposition; but it shews that, under favourable circumstances, the predisposition may never pass into actual disease, and that the blood has either been in a tuberculous state in a slight degree only, or, if more intensely affected during the period of growth and development, that it has recovered the standard of health at a later period of life. Even the conformation of the osseous skeleton, as of the bones of the chest, for instance, will improve, if the constitution of the blood be improved,—a circumstance which has been occasionally observed to happen without obvious cause. Again, it is most important to state, that tuberculosis may attack, not only individuals of this particular habit, but even the robust, with a complete physical development, well-formed chest, and great muscular power. It may occur in either of the temperaments; lymphatic, sanguine, choleric, nervous, or melancholic; although more frequent in the first than in either of the others, and least frequent in the last. Individuals of a decidedly sanguine temperament occasionally die of phthisis. Examples of this are, however, comparatively rare; they occur most frequently in middle life, and they indicate the spontaneous generation of the disease, in the individual, rather than the hereditary transmission. In these cases, the causes of tuberculosis have operated at a later period of life, when the tissues and organs were completely formed, and when no more than the ordinary slow progressive waste and nutrition were in play; the result being the deterioration of blood, the rapid formation of general tuberculosis, and a quick deposition of tubercle in one or more organs, but without those modifications of the organic structures generally which constitute the predisposition, and which take their origin most especially during development and growth."

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[1] Works by Palmer, vol. i., p. 590.

The general inferences and propositions contained in the foregoing passages may be regarded as presenting, on the whole, a correct and just view of the opinions of most pathologists at the present time, on the nature and pathological relations of the condition of the system to which the name of TUBERCULOSIS has been given. It is a peculiar state of the blood, if not in the first instance, at least in a very early part of its history; and throughout, this condition of the blood not only continues, but in certain respects is increased, and becomes more intense. It is therefore not wonderful that analytical researches of chemists differ in their results; and that it is so difficult to obtain results which are harmonious and consistent. The blood is in a constant state of change and fluctuation, according to the variable state of those functions on which the state of the blood depends;—the condition of digestion; of assimilation, primary and secondary; of respiration; of secretion; probably, as Dr Holland suggests, of innervation. If digestion in the stomach and *duodenum* is imperfect and disordered, assimilation is imperfect and disturbed in consequence; and the chyle which is transmitted through the lacteals and veins is either imperfectly elaborated, or contains elements which it ought not to contain, or is destitute of elements which it ought to possess. If respiration be in fault, if the air breathed be bad, poisonous, miasmata, we know from ample and undoubted experience that this acts in a most direct manner in deteriorating the qualities and condition of the circulating fluid. Looking at the inhabitants of miasmatic districts, and beholding their pale sallow faces and dingy-coloured skins, affords sufficient proof of the correctness of this inference. There may further be something in the action of the lungs, in the mode in which these organs act upon the air, that may modify and greatly influence the state of the respiratory function.

Further, if the various processes of secretion be feeble, inactive, and perverted; if articles which ought to be eliminated from the blood be retained in it, as the elements of bile, of urea, and probably other substances; it is easy to see that the blood so constituted cannot be in a healthy state. This is a frequent condition of disease of the blood in gout, rheumatic gout, chronic rheumatism, and several other morbid states connected with impaired and retarded digestion.

But, independent of all these sources of contamination and disease of the blood, it would appear that this fluid, under certain circumstances, loses of itself, as it were, its proper nutritious and reparative power. The blood evidently possesses a power of assimilating certain foreign substances,—all the organic products employed as articles of food. It is not ascertained whether it owes this power to some inherent property, or to the saline matters, with which it is normally impregnated. All that is known is, that when the saline matters are deficient, disproportionate, excessive in one direction and defective in another, the blood loses its power of nutrition, or rather becomes unfit for nutrition, and disease follows;—paleness, feebleness, loss of flesh and strength; in short, an anæmious state. This condition the late Dr Prout seemed disposed to attribute to the deficiency of saline ingredients, which he believed were requisite to the normal healthy constitution of the blood; and, in consequence of which being deficient, those actions and processes, probably electric, or electro-magnetic, for the requisite applications of the nutritious parts, did not take place. All this must of necessity be matter of conjecture; and, though it is not desirable to admit unknown causes of morbid conditions without sufficient proof, yet various facts seem to shew, that of this there is as much probability as of many other morbid states.

One observation more only on this subject we make. There is too great a disposition in all instances to consider disease as a positive state;—as something having an active existence. To do so is quite natural; for it would be difficult to speak or to reason about it without doing so. At the same time it ought never to be forgotten, that disease is, correctly speaking, a negative condition. The positive condition is health; the absence of this condition, the negative of it, is disease. So with regard to morbid states of the blood, and especially that called *Tuberculosis*, they are not positive conditions. They are merely the absence of the healthy state of this fluid, whether this consist in the presence of morbid matters that ought to be rejected, or in the absence of healthy elements, the presence of which is requisite. The blood ceases, from various causes, to possess those principles and properties which fit it to act as a nutritious fluid. It accordingly does not nourish; and the organs and body at large are wasted, from not being supplied with materials to repair waste. It is true that the blood, besides losing certain principles and properties, possesses others which are not natural,—which are, in short, morbid. But it is to be remembered, again, that these morbid principles are not really new principles, but degraded forms of original principles. Even the analytical researches quoted by Mr Ancell shew how slight is the change, how small and insignificant, apparently, is the deviation, in the most intense instances of Tuberculosis. No element or principle is absolutely wanting. One is a little in excess, another is a little in deficiency; and these are all the tangible points on which the pathological inquirer can fix. Perversion, even in the proper sense of the term, it is impossible to detect. The blood is in some manner without those principles and qualities which enable it to be employed as a nutritious fluid; and this seems to be all that can be said, after much microscopical examination, and not few chemical experiments.

Mr Ancell, in his third chapter, considers the subject in great detail; and in five sections presents the reader with detailed views of the altered state of the different functions in *Tuberculosis*. Our limits permit us not to follow him in this course, in which, nevertheless, we assure our readers that they will find much instructive information. We shall merely place before them the general inferences which the author thinks to be established, regarding the state of the blood in *Tuberculosis*, as contributing to the loss of flesh and strength in that state of the system.

"The debility of tuberculosis indicates a *direct* loss of power, and the whole of the phenomena of the predisposition and the symptoms of the disease shew;—

"1. That from the earliest invasion, the sum of the vital force is either below the standard of health, or it is relatively low as respects the structure and organisation of the individual.

"2. That this diminution in the sum of the vital force depends especially upon diminished vitality of the blood, and of the cellular, gelatinous, and muscular tissues produced and nourished from an imperfect blastema derived from the diseased blood.

"3. That, as tuberculosis advances, the sum of the vital force for the whole system continues to diminish; this loss of vital force being exhibited not only in the defective manifestation of voluntary and involuntary muscular power, but in the diminished resistance of the vital powers of the blood and of the cellular and muscular tissues to the change of matter in the animal body; hence, in tuberculous subjects, the rapid diminution of the red corpuscles of the blood, the deterioration of the vital qualities of the *liquor sanguinis* and of the blastema, the diminished plastic power of the cells, the low calorific power, and the emaciation.

"4. That frequently, but by no means universally, the nutritive powers of the blood, as respects the nervous tissue, remain undiminished, this tissue not requiring for its nutrition compound principles identical with it to be introduced into the blood with the food, and having a nutrition peculiar to itself, differing from that of the cellular and muscular structures. Hence the diminution of vital force is not exhibited in the nervous system, but, as conductors of the force generated by the change of matter in the whole system, the nervous system remains intact. The particular condition of the vital force is, nevertheless, manifested through the nerves; hence activity and action without power, morbid irritability, &c. It is the highest manifestations of the vital force dependent upon nervous structure, as sensibility and mental phenomena, which so frequently remain unaffected during the physical degeneration. These phenomena are often rather augmented than diminished, the nervous matter, although perfect in structure, being more exposed from the waste of its cellular coverings; hence, frequently, increased sensibility to impressions in tuberculous subjects; and this occurring in the predisposed from the earliest age, and throughout a series of years, an acuteness of intellect is often exhibited.

"In estimating the symptoms of tuberculosis in a practical point of view, their absolute value, taken singly, is comparatively little, since one and all occur in other diseases. It is their relative value, —the association of several,—or the harmony of many in one case; the manner in which they arise,—and their mode of succession,—which distinguishes them from the symptoms of other diseases, and assists us in the differential diagnosis. Many of these symptoms are found associated in chlorosis, simple anæmic debility from venereal excesses, and other conditions of the economy. To those who have well considered the details of the tuberculous constitution, the difficulty of the diagnosis is considerably diminished. The symptoms, viewed in combination and relatively, rarely mislead, especially when they are decided in their development, constant, and progressive. In difficult cases our judgment may frequently be determined by a knowledge of the antecedent existence, or the absence of the predisposing and inducing causes,—as, for instance, of the hereditary taint, or a long-continued anti-hygienic regimen. In reference to the general disease, it has to be kept steadily in mind, that the diagnostic object is not to determine whether a local tuberculous development exists,—a tuberculosis pulmonalis or abdominalis,—but rather to determine *whether the patient is truly affected with the blood disease, and thereby threatened with its local manifestation.* The successful treatment of the disease of the blood in this stage, based on a knowledge of its nature and causes, is, in many instances, certain. The successful treatment of the disease after it has localised itself is frequently impossible.

While I refer all the symptoms described to the tuberculous state of the blood on the one hand, there is frequently, as they present themselves in various groups, a direct relation subsisting between them and the pathological effects of tuberculosis to be described in another chapter. The defects of the osseous system, arising from perverted organisation and nutrition of the bones, are in direct relation to the scrofulous affections of the bones, which so frequently occur. The malnutrition of the lungs and thoracic parietes are in direct relation to the occurrence of disease of the lungs. The weak organisation and depraved digestive fluids of the alimentary canal, taken with bad diet and other anti-hygienic influences, are in direct relation to mesenteric phthisis. Again, as illustrating the relation of cause and effect in the ultimate result, where the subjects of tuberculosis are fed with unwholesome and insufficient diet, they present after death, more frequently than other tuberculous subjects, pathological lesions of the alimentary canal. Fournet states, that tuberculous subjects who had been fed on a sufficient and wholesome diet, scarcely ever experienced disturbances of digestion until towards the close of life, and after death he did not find a trace of intestinal tuberculisation; while in those who, on the contrary, had been badly nourished for a long time, the dyspeptic symptoms were very prominent, and intestinal tuberculisation was almost constant. I believe this statement to be somewhat too exclusive. But at the same time the complicated relations subsisting between—1, the effects of the blood disease and the local disease; 2, the effect of external agencies on the animal economy modified by the blood disease are undoubted; and when we consider them, it only enhances the necessity which exists of our improving the pathology of the general disease.

"The uniform association of structural and functional aberration in the tuberculous constitution is very striking. The remark made by Louis, that 'a function may be more or less seriously interrupted for a long time without the organ presenting any appreciable change of texture,' is undoubtedly true; but we must not overlook the qualification,—*appreciable*. This great pathologist evidently meant,—without any of those well-marked pathological results which usually enter into the *post-mortem* descriptions. A change of function always implies a modification of structure, and most especially so in a tuberculous subject. In such a subject debility, defective digestion, and depraved secretion, for instance, never occurs without implying a modification of structure in its nature tuberculous.

"Such, according to my view of tuberculous and scrofulous affections, is tuberculosis, as an essential disease of the blood, to which man, and the animals immediately beneath him in the zoological scale are subject more or less, at all periods of life, from early embryotic development to old age and decrepitude. Many will regard the disease thus described as an abstraction; and it must be admitted, that, as it comes under the cognisance of the practitioner, it is rarely made the subject of his consideration and treatment until some local affection of a particular tissue or organ has proceeded so far as to complicate its symptoms; and still more rarely does it proceed to a fatal issue without some local affection having supervened. Nevertheless, throughout the progress of all the local diseases constituting varieties of tuberculosis, the symptoms and characteristics of the general affection may be recognised; it occasionally happens, that tuberculosis proceeds in the adult to the last stage of marasmus and a fatal issue without hæmoptysis, the aggregation of tubercle, or any obvious local affection. This is a more frequent occurrence in the early periods of life. It frequently appears also, that some local affection—as tubercles in the lungs—supervenes, but of so circumscribed an extent, that it interferes little with the functions of the organ, or the general symptoms of tuberculosis, or of the tuberculous predisposition, and from hygienic or other causes the general affection subsides, and nature renders inert the local mischief by a cretaceous formation or a fibrinous deposit. Occasionally the local affection is too trivial to compromise life, and yet the patient goes on dying of the general disease. This frequently happens in children, and sometimes in adults, as proved by symptoms before death, and the existence of too circumscribed an organic affection, detected *post mortem*, to account for the death; but the most frequent result is, that organic disease sets itself up, and complicates and very materially modifies and precipitates the symptoms, progress, and termination of the general affection.

"The essential condition of the blood, upon which the signs and symptoms of tuberculosis depend, is still a problem. In fatal cases one or more organs, as the lungs, the brain, the mesentery, and the intestines, have generally become so far affected as to be incompatible with the continuance of life. In a future chapter the special pathology will be fully considered, and, to complete the history of the disease, the influence of the various organic affections over the original disease, and in the production of the usual fatal termination, ought to be estimated; but it may be here stated, that the diseased condition of the blood, the deterioration of the circulatory and more stationary fluids and solids, the emaciation, and the failure of vital force, are of themselves, in this general disease, totally apart from any special affection of an organ, fully adequate to produce such a result; and there can be no doubt that, in many instances, death is as much the consequence and the natural termination of the general disease as of disease of any vital organ."

These observations by Mr Ancell prove at once to demonstration, that we do not overstate the little, the small change that can be shewn to have taken place in the blood in giving rise to the effects of Tuberculosis. The change is so small, that he allows that its essential nature is still problematical. In other words, all that has been ascertained,—after all the speculation, inquiry, microscopical examination, and chemical research,—amounts exactly to this, that nothing certain, positive, or tangible, is known about it.

We ought now to proceed to the account of TUBERCLE given by Mr Ancell, which is ample, correct, and detailed; but here, for the present, our limits oblige us to make a pause. We shall, however, take an early opportunity of directing attention to the further contents of this comprehensive and elaborate treatise; and we shall probably then be in a condition to say how far the treatment of consumption—whether prophylactic or curative—may be allowed to have derived advantage from the researches of physicians and pathologists.

It is probably necessary here to mention, that in the estimate made at p. 385 of the number of persons destroyed, or rather that ought to be destroyed, by consumption, upon the supposition that the estimate of Dr Woolcombe in 1808 was correctly made, proceeds upon the condition, that the whole population of England and Wales is at present, at the lowest computation, eighteen millions. The number returned by the census made on the 31st March 1851, was 17,922,768 persons. The census of 7th June 1841, gave 15,914,148 persons. This marks an increase, in the course of ten years, of 2,008,620, or, as nearly as may be, two millions of persons This denotes an annual increase of 200,000 (two hundred thousand) persons. Consequently, since 1851, or after the lapse of two years, nearly 400,000 must have been added to the population; and, notwithstanding emigration, and the large numbers that have left the country during the last twelve months, at least 200,000, if not 300,000. So that the total population of England and Wales may justly be stated at probably eighteen millions and one-fifth.

ART. II.—1. *On the Nature and Treatment of Diseases of the Kidney connected with Albuminous Urine (Morbus Brightii).* By G. OWEN REES, M.D., F.R.S., Fellow of the Royal College of Physicians; Assistant Physician to and Lecturer on Materia at Guy's Hospital; Principal Medical Officer to the Pentonville Prison. London, 1850. [29th December 1849.] 8vo. Pp. 134.

2. *The Pathology of the Kidney in Scarlatina. Illustrated by Cases.* By JAMES MILLER, M.D., Extraordinary Member of the Royal Medical Society of Edinburgh; Member of the Royal College of Physicians, London; and Physician to the Western General Dispensary, Lisson Grove, &c. London, 1850. [January 1850.] 8vo. Pp. 177.

3. *On the Diseases of the Kidney: their Pathology, Diagnosis, and Treatment; with an Introductory Chapter on the Anatomy and Physiology of the Kidney.* By GEORGE

JOHNSON, M.D., London; Fellow of the Royal College of Physicians; Assistant Physician to King's College Hospital. London, 1852. 8vo. Pp. 517. [June 1852.]

In the year 1845, Dr Johnson communicated to the Medico-Chirurgical Society an Essay on the Minute Anatomy and Pathology of Bright's Disease of the Kidney, and on the Relation of the Renal Disease to those Diseases of the Liver, Heart, and Arteries, with which it is commonly associated. Of this Essay,—which was published in the twenty-ninth volume of the Transactions of the Medico-Chirurgical Society,—a full account was given in the sixty-eighth volume of this Journal (October 1847), along with an account of various important observations on the same subject made by Mr Joseph Toynbee,—a paper also published in the same volume of the Transactions.

In this paper, Dr Johnson regarded the granular disease of Dr Bright as a sort of exaggeration or aggravated state of the fatty matter naturally existing in the kidney, or a sort of fatty degeneration of the kidney. In a subsequent volume (the seventy-third, 1st April 1850) of this Journal it was shewn that Drs Corfe and Gluge had taken the same view of the albuminifacient disease of the kidney, and which was accordingly designated by the latter author by the characteristic name of STEAROSIS. This, it was at that time remarked, should have been STEATOSIS.

At the time at which this paper by Dr Johnson was noticed, the opinion was expressed, though not very confidently, that the view given by Dr Johnson was something too exclusive, and that there was reason to believe, that though certain cases of diseased kidney and albuminous urine might be associated with fatty degeneration, there might be others which, it appeared to us, were not connected with, or dependent upon this species of degeneration, Mr Busk and Dr Owen Rees, we observe, are of the same opinion.

The former, in a paper communicated to the Royal Society subsequent to that given by Dr Johnson, arives at the conclusion, that adhesive inflammation of the *tubuli uriniferi* and venous plexus of the kidney was by far the most frequent cause of chronic albuminuria, and what is termed Granular Degeneration of the Kidney. This accords very closely with the opinion which we felt it requisite to give in 1847, when we stated certain circumstances which seemed to be at variance with the idea proposed by Dr Johnson,[1] of the disease consisting in all instances of fatty degeneration of the gland.

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[1] Edinburgh Medical and Surgical Journal, volume sixty-eight, p. 485.

Mr Busk further states it to be his opinion, that, though oil frequently exists in the *tubuli uriniferi*, its presence ought not to be regarded as having any direct or necessary influence in the production of albuminuria, since this condition does not take place in some cases of jaundice distinguished by a fatty condition of the kidney; and since albuminuria may exist without any fatty degeneration in the kidney being discernible.

Dr Owen Rees, in like manner, calls in question the correctness of the proposition, that Granular Disease of the Kidney consists in, and depends upon, fatty conversion or degeneration of the gland. He allows that in certain instances kidneys so changed have externally and superficially a fatty aspect; and he mentions one instance in which a kidney so diseased was believed in this manner to be probably fatty, but in which, upon chemical examination, less fat by a great deal was found than in the kidney reported healthy. The evidence, indeed, he regards as insufficient. Dr Rees justly remarks, that neither mere external inspection nor microscopical examination will in all instances suffice to determine, whether any organ, especially the kidney, be fatty or without that substance. The only certain means for obtaining positive information is observing the effect of chemical agents and reagents. The best solvent of fat is ether. If, after its application, the mass be found to have disappeared, it was most likely all fat. If its general appearance have become altered, the fat was a constituent. If, however, it remains unchanged, then we may conclude, that we have been altogether deceived by sight and external appearances. "I have," he adds, "satisfactorily determined by this test, that some forms of degenerated kidney shewing a fatty appearance really contain no excess of fatty matter, though the contrary is certainly quite as frequently the case." (P. 17.)

Dr Johnson had further imagined an analogy, it will be remembered, between granular kidney and fatty degeneration of the liver. Dr Rees is by no means satisfied of the correctness of this analogy, for the reason that, judging from the proportion of fat contained in such kidneys, they decidedly make an approach rather to organs suffering from scrofulous deposit than from true fatty degeneration. Strumous deposits, he reminds the reader, are fatty; sometimes sufficiently so to deceive the sense of sight into a belief that they are entirely composed of fat; and the microscopical oily particles contained in the tubules of the cortical substance, and occasionally found attached to the casts of the tubules thrown off in the urine, may be regarded as necessary consequences of the existence of strumous matter in the organ. Tubercular matter in the abdomen has been found to contain 25·4 parts of fat in 106·18 of its solid matters. Skirrhus has been shewn to contain 10 per cent. of fat in its solids. Enkephaloma, he might have added, contains rather more.

Dr Rees then gives the results of three analyses which he made, with the view of affording means to determine this question, and in order to institute a comparison between the healthy and diseased organs.

	No. 1. Health.	No. 2. Enlarged grayish oily-looking Kidney.	No. 3. Enlarged Kidney, considered probably fatty.
Water, .	74·83	81·277	82·27
Fatty matter,	1·86	2·902	0·50
Urea, . .	a trace.	0·145	a trace.
Other solids, .	23·30	15·676	17·23

The specimen which served for the first analysis here given, was obtained from a man who died a violent death. The organ had the appearance of health in every respect.

The specimen on which the second analysis was performed was prominently marked by the characters believed to denote the fatty state.

The third specimen was sent to Dr Rees by a gentleman who considered it to be a fatty kidney. It was certainly greasy on the surface. It was proved, however, to contain less fatty matter than the healthy organ, and was one of those kidneys which had probably been affected by the adhesive form of inflammation, and had been infiltrated with its products, namely, the deposit of white material in the cortical portion of the gland, which, it will be afterwards seen, forms the Acute Desquamative Nephritis of Dr Johnson.

After noticing the theory of Dr Johnson, as stated in his Essay, and as given in the sixty-eighth volume of this Journal, Dr Rees gives the following as the result of his own observation and reasonings upon this question.

He thinks it established with considerable certainty, that by far the greater number of cases of kidney disease connected with albuminous urine are the consequences of inflammation, probably of an adhesive character, affecting the organ and causing deposit in its substance. This state may or may not be followed by contraction and shrivelling. The rarer form of the diseased organ is that in which the kidney is infiltrated with tubercular matter, containing fat as a constituent. That congestion may in some cases precede, or even accompany this cachectic deposit he thinks very probable, its analogy with tubercular disease in other organs, especially the lungs, becoming thus manifest. He regards it, however, as scarcely probable that congestion is a necessary antecedent to all chronic forms of the disease.

With regard to the presence of fat in the urine of patients suffering under albuminuria, some time back, Dr Rees had occasion to examine the urine of such a patient; and in this he observed many corpuscles having the appearance of fatty matter. Ether extracted masses of fat from the specimen; and Dr Rees watched carefully for the result of the case, in order, if possible, to ascertain whether this urine proceeded from a kidney that was or was not affected by fatty degeneration. On examining the organs after death, he found, instead of the fatty condition of the kidney, that these organs were indurated and somewhat contracted, infiltrated by hard white deposit; a diseased condition, not uncommonly observed in persons of gouty diathesis, of which this patient was the subject. The presence of fatty matter in the urine was in all probability accidental to the kidney disease, and connected perhaps with lesion of the liver and interruption to its functions.

The objections now stated, both in the form of facts and arguments, will probably be sufficient to shew, that the inference as to the constant correctness of the proposition, that the granular kidney consists in fatty degeneration, was something hasty and premature. It is not by this meant to say, that it is unfounded. It is probably true of a certain number and proportion of cases of granular kidney, but not applicable to and embracing all. It is interesting to remark, in this inquiry, that Dr Johnson himself had come to see, that the hypothesis originally proposed in 1845 was not so generally applicable as he imagined. Through errors, sometimes not few, we arrive at truth; and, after several wanderings and deviations, we get into the right road. It seems, indeed, necessary, in every inquiry like the present, that a certain number of erroneous views must be taken and examined, before it can be ascertained which is the right one. The approach through error to truth is, in short, always slow and progressive.

Dr Johnson subsequently published, in the thirtieth volume of the Transactions of the Medico-Chirurgical Society, a paper in which he modified the views previously given; and recognised, as connected with an albuminous condition of the urine, the four following forms of disease: first, Acute Desquamative Nephritis; secondly, Chronic Desquamative Nephritis; thirdly, Simple Fatty Degeneration; and fourthly, a Combination of Fatty Degeneration with Desquamative Nephritis.

In the course of several years, Dr Johnson allows that he had occasion several times to modify his views as to the nature of this disease; and we have no doubt that he has rectified them, and made them approach more nearly to the truth of nature. In the present volume he gives the results of all his observations and rectifications, and presents his views of the several forms of diseased kidney, as matured, not only by his own industry and reflection, but by the effect of the criticism and discussion of various members of the profession.

Dr Johnson refers the albuminuric diseases of the kidney at present to nine orders or forms: first, Acute Desquamative Nephritis; secondly, Chronic Desquamative Nephritis; thirdly, Waxy Degeneration of the Kidney; fourthly, Non-Desquamative Disease of the Kidney; fifthly, Fatty Degeneration of the Kidney; sixthly, Suppurative Nephritis; seventhly, Tubercular or Scrofulous Disease of the Kidney; eighthly, Cancer of the Kidney; and ninthly, Hæmaturia, or Bloody Urine.

I. The first of these forms of Albuminifacient Renal Disease, or Acute Degenerative Nephritis, consists in a congestive or inflammatory state of the texture of the kidney, perhaps mostly seated in the cortical part, and chiefly the tubules, but which has the effect of producing an exfoliation or desquamation of the epithelial cells and scales which line these tubules and cover the calycine membrane; and hence, probably, such an admixture of the albuminous part of the blood as gives rise to the phenomenon of albuminous urine. This inflammatory and congestive state also affects, according to the account of Dr Johnson, the *Corpora globosa*, or the Malpighian bodies, and occasionally may destroy one or two of these bodies. But its principal action seems to be directed either primarily, or as a means of relieving the congested state of the cortical tissue generally, upon the tubules and their epithelial covering.

The most eligible mode, however, to communicate a proper idea of the nature of this form of disease of the kidney, is to place before our readers the account of the morbid anatomy of the disease, as given by Dr Johnson.

"A microscopical examination of the kidneys shews that the disease affects chiefly the cortical portion of the gland, and that the morbid deposits are mostly limited to the interior of the convoluted tubes. Most of these tubes are found to be unnaturally opaque, in consequence of being filled by epithelial cells which have been formed within them and thrown into their cavity. The tubes are crowded with these cells in different degrees, some being fully distended, while in others there is little evidence of the desquamative process having occurred, there being only a single layer of epithelium on their walls, and this either differing little from the normal appearance, or perhaps being unnaturally opaque and granular in texture. The most crowded tubes will usually be found in those parts which, to the naked eye, appear pale and anæmic. Some tubes appear to be rendered more opaque by the effusion of the coagulable constituents of the blood amongst the epithelial cells, in which case the addition of acetic acid clears the tissues and facilitates their definition, so that a tube which had previously presented only a confused, granular, and opaque appearance, may be seen to be filled with epithelial cells which have been shed into its cavity.

"Besides the crowding of the tubes with epithelium, additional evidence of the kidney having been the subject of the desquamative process, is afforded by the numerous epithelial cells which are scattered about the field, when a portion of the kidney which has been scraped or torn with needles is subjected to microscopic examination, the number of detached cells being in such cases very much greater than when a portion of healthy kidney is subjected to the same process. Frequently, in the examination of the tubes, a portion of their contents being squeezed out, presents exactly the appearance of the *epithelial casts* which have been described as existing in the urine.

"It has already been intimated (p. 94) that the red spots visible on the capsular surface, and on a section, are composed of tubes filled with blood, some of which, having been recently effused, retains its bright red colour, while, in other instances, where it has remained for a longer time in the tubes, it is more or less disintegrated and granular, and has a yellowish or brownish hue.

"In some of the tubes, the epithelium will be found to contain oil in minute quantities, and not exceeding what may often be seen in kidneys which are apparently quite healthy. This, therefore, is neither an essential nor an important part of the morbid anatomy of the disease under consideration.

"Many of the straight tubes of the medullary cones appear quite normal, while others are opaque and filled with cells more or less disintegrated, which seem to have been washed into them from the convoluted tubes. These abnormal materials in the straight tubes have none of the appearances which would indicate that they are the modified epithelium of the tubes which contain them, and when a favourable opportunity occurs for examining the epithelial lining of these tubes, it is generally found to present a natural appearance, or to be only so far changed as would be accounted for by the passage through the tubes of an abnormal and irritating secretion.

"The examination of the Malpighian bodies very naturally follows that of the tubes with which they are intimately connected. Before the structure and functions of these bodies had been accurately determined, it was customary to assign to them the chief agency in all the morbid changes of the kidney, and Bright's disease was sometimes vaguely pronounced to be an 'inflammation of the Malpighian bodies.' Now, happily, since Mr Bowman has placed the anatomy and physiology of these bodies in so clear a light, it is not difficult to speak with precision of the pathological changes which they undergo. At present, we are concerned only with the changes which occur in the acute form of the disease now under consideration.

"The slightest departure from the normal condition consists merely in an increased fulness of the capillaries—an engorgement with blood which appears of a bright red colour, as seen through the capillary walls. The Malpighian bodies, in this condition of simple engorgement, appear to the naked eye like minute bright red grains. But when there has been acute desquamation with an albuminous condition of the urine, the greater number of the Malpighian bodies present the following appearances. As seen by the naked eye, they do not appear red, but they may be distinguished from the surrounding tissues by having a lighter colour and a less opaque appearance. Under the microscope they have the appearance which is represented in the accompanying figure.

"The capillaries at the first view seem to be bloodless, and to have small cells upon their surface; but, on a careful examination, these are found to be blood-corpuscles modified in appearance by being seen through capillary walls which have been rendered thick and opaque by the transudation through them of an albuminous or fibrinous effusion. The surface of the capillaries often appears rough and very finely granular, as if from the coagulation upon them of some of the materials which have escaped through their walls, but I have rarely seen any organised effusion upon them or within the Malpighian capsule. The corpuscles usually form a single row in the canal of the capillary; they often present a dot in the centre, and they differ from the ordinary appearance of the blood-corpuscles, chiefly in being somewhat larger and of a lighter colour. That they are blood-corpuscles in the canals of the capillaries is, I think, unquestionable; but it is less certain whether their modified appearance is entirely due to the opacity and thickening of the capillary wall, or whether the corpuscles themselves have undergone some change. I believe that the first-mentioned condition is the chief, if not the sole, cause of the appearance in question.

" In addition to the changes already mentioned as occurring in the Malpighian bodies, there may occasionally be seen one in which the capillaries having given way, the blood has escaped into the capsule, and thence into the tube, thus forming the spots of extravasation which have been already alluded to. In whichever of the before-mentioned conditions the Malpighian bodies are found to be, I have never seen them decidedly enlarged or dilated. This is a point which is very easy of observation, since the bodies are readily defined, on account of the contrast of their whitish and semi-transparent appearance with the dark-coloured and opaque tubes, the former being free from deposit, and the latter gorged with their accumulated contents.

" In describing the condition of the Malpighian bodies, I have necessarily spoken of a portion of the vascular system of the kidney, and a few additional observations upon this subject will suffice.

" The kidney, affected by a recent attack of acute nephritis, is more readily injected than when it has been the subject of any other form of disease, and a careful injection will generally fill, more or less completely, the entire vascular system. The parts which are less perfectly injected will be those patches which, before injection, appeared exsanguine, and which have been already described as consisting of tubes greatly gorged by their accumulated contents, where the intertubular vessels appear to be compressed by the surrounding swollen tubes. In most instances, a microscopic examination of thin uninjected sections will afford more exact and valuable information as to the state of the bloodvessels than can be obtained by an inspection of injected specimens. Both methods of examination, however, have their advantages, and neither should be neglected. The result of the examination is, that in acute nephritis, all the vessels are pervious. The arteries are congested, but present no structural change in their walls. The Malpighian capillaries are, in the early stage, gorged and transparent, but afterwards their walls become opaque and thickened, apparently from the transudation of serum through their coats, and probably from the coagulation of some materials upon their surface; in consequence of this change in the coats of the vessels, the blood-corpuscles within them have a modified appearance as already described. The intertubular capillaries present no marks of structural change, and appear to contain less blood than in the healthy kidney. The branches of the renal vein are healthy, but occasionally they have coagula within them. It has already been mentioned that the veins in the medullary cones are gorged, probably in consequence of retarded circulation, produced by pressure from the swollen cortical substance lying between the cones. The congestion of the mucous membrane of the pelvis and ureter has also been alluded to, and will presently be explained."—(P. 104.)

The facts here stated as derived from dissection and microscopical inspection, lead naturally to the inferences which may reasonably be deduced from these facts. These pathological inferences are stated in the following manner.

"PATHOLOGY OF THE DISEASE.

"Having now examined the morbid anatomy of acute desquamative nephritis, we are prepared to enter upon the subject of the pathological interpretation of the various conditions which our anatomical investigations have revealed to us. In the first place, it will assist us to comprehend the whole subject, if we make some general observations illustrative of the proposition which we shall adopt as a central truth—viz., that *all the changes of structure commence in the secreting cells of the gland, and are the result of an effort made by the cells to eliminate from the blood some abnormal products—some materials which do not naturally enter into the composition of the renal secretion.*

Allusion has already been made to the physiology of secreting cells, and it has been shown that the cells of the different glands have characteristic appearances, which render it quite easy for a practised observer to distinguish them from each other. The cells of the liver, for instance, have a very different appearance from those of the kidney. It is quite evident, too, that their appearances are not more diverse than their vital powers. The cells of the kidney have the power of secreting urine, while those of the liver secrete bile. And although, from an examination of the cells, the physiologist could not have predicted what would be the nature of their secretions. yet he rightly concludes that there is an intimate relationship between the structure and appearance of the cells and the nature and composition of their secreted products, so that he learns to attribute to a cell having certain characteristic appearances, the mysterious vital power of secreting the constituents of urine, while with a cell having certain other appearances, he associates the power of secreting bile.

"The next point which it is important to observe is, that the cells of each gland, besides the constituents of their own proper secretion, have also the power of separating from the blood certain materials which do not form a part of their normal secretion. It is well known, that many salts and many odorous and colouring matters, derived from the vegetable and animal kingdom, when introduced into the blood through the stomach, are eliminated by the kidneys; and the separation is effected so quickly and so completely, as to justify the belief, that the materials in question are secreted by the renal cells with as much facility as those which constitute their own proper secretion. In regard to some of these materials, it appears in the highest degree probable, that they may be secreted by the kidneys for a long time and in large quantities, without producing any perceptible change in the structure of the gland, or any other modification of the urine than the mixture with it of the salt or other foreign substances, with the addition, perhaps, of a certain quantity of water, which is required to keep the materials in solution. Whether any matters, not being constituents of healthy urine, can be secreted by the kidneys without producing some slight modification of the secreting cells, may perhaps admit of doubt; but the effect upon the cells is not commonly so injurious, that the physician need hesitate to give his patients for weeks, or even months, consecutively, such medicines as iodine of potassium, although he knows that this new material is continually being secreted by the renal cells, and so mingled with the urine.

"It is important, however, to observe, that there are some materials which, when secreted by the kidneys in moderate quantities, and for a short time, appear to lead to no injurious consequences, may yet produce very decided changes of structure, after the long-continued secretion of the same materials in larger quantities. We have an instance of this, in the secretion of sugar by the kidneys in diabetes. It is now a well-ascertained fact, that this disease consists in an imperfect digestion and assimilation of certain alimentary materials, as a consequence of which, the sugar which is formed in the stomach and intestines enters the blood, and is thence removed by various secretory organs, but chiefly by the kidneys. The sugar is a powerful diuretic, its passage through the secreting cells being accompanied by a flow of water from the Malpighian bodies, sufficient to keep it in solution. It can rarely happen, that an opportunity offers for examining the kidneys in the early stage of diabetes, so as to ascertain the condition of the cells at that period; but we know that for many months, several pints of urine will be secreted in the day, and this, without any evidence of the slightest imperfection in the discharge of the functions of the kidney. It is highly probable, however, that from the commencement, the secretion of sugar is accompained by changes in the appearance of the cells; and after the long continuance of the disease these changes are very decided. In two cases of death from diabetes, I found the convoluted tubes of the kidney remarkably opaque, and having a yellowish tinge, the cells being also opaque, from containing a large quantity of finely granular matter with oil. In one case the urine had been albuminous and contained granular casts; of the urine in the other case I have no information, except that it was saccharine. The appearance of the gland-cells in the two cases was very similar and was doubtless connected with the continued secretion of sugar. An albuminous condition of the urine, with more or less of structural change in the kidney, has, as Dr Christison remarks, been observed to occur so frequently in connection with diabetes, that their concurrence can scarcely be considered as altogether accidental. The probable explanation of the phenomena is, that the long-continued secretion of sugar by the kidneys modifies the gland-cells, effecting a change in their appearance and in their vital endowments, so that in adapting themselves to the secretion of sugar, they become more or less unfitted for eliminating the constituents of their own proper secretion. This effect of the secretion of entirely new materials by the gland-cells, is no more than might have been inferred *à priori*, from a consideration of the physiology of secretion, and of the specific characters which mark the cells, no less than the secreted products of each gland.

"We have another illustration of the effect upon the secreting cells of an effort to eliminate new materials in cases of jaundice. When, from any cause, the functions of the liver are so imperfectly performed as to allow of the bile accumulating in the blood, the urine is found to be deeply tinged with some, at least, of the constituents of the biliary secretion; and on a microscopical examination of the urine, we find the renal secreting cells in variable numbers, some being scattered, while others are entangled in moulds of the kidney tubes, and all of them coloured by the bile contained within them. When we have an opportunity of examining the kidney after death in these cases, we find the tubes deeply tinged by the bile contained in their secreting cells, and some tubes are nearly or quite filled with cells which have been thrown off, while others have been formed upon the basement membrane beneath them. Thus it appears that when the blood circulating through the kidney contains an excess of bile, the renal cells, in striving to eliminate these materials, become deeply tinged by it, and many of them are so far modified, as to be shed by a process of desquamation.

"In the instances here adduced of a change in the structure of the renal cells effected by the secretion, in the one case of sugar, and in the other of bile, we have tolerably conclusive evidence as to the nature of the materials which have modified the cells. In many cases, however, we know nothing certain as to the nature of the material; and the evidence that there is some *materies morbi* which excites the renal disease is derived—1*st*, from a consideration of the circumstances under which the disease occurs. These have been referred to at some length in the preceding chapter, where an attempt was made to establish the proposition, that *all the causes of renal disease have this common feature, that they tend to produce a morbid condition of the blood.*

"2*d*, We gain additional evidence upon the point in question from analogy. We know that during the process of normal secretion, there is no visible shedding of secreting cells; but we have seen that certain materials foreign to the renal secretion, while they are passing through the gland-cells, so modify the process of secretion and of cell-growth, as to give rise to a desquamation of cells from the renal tubes. And this observation will suffice to shew the probability that, in other cases, a like process of desquamation results from a similar cause, viz., an elimination of some morbid material by the renal cells. When, therefore, a patient has been exposed to one or more of the influences alluded to in the preceding chapter, as tending to produce a morbid condition of the blood, and when the urine presents the signs of the desquamative process occurring in the kidneys, there can be little doubt that this desquamation is the result of an effort to eliminate some of the abnormal materials, which have either been introduced into, or developed within the blood.

"The reader who has attended to the preceding detail of facts and inferences, will have no difficulty in perceiving their applicability to the pathological explanation of the morbid changes produced by desquamative nephritis.

"It is assumed, that the blood being in a morbid state, whether from the poison of scarlatina, or from any other of the various causes alluded to in the preceding chapter, an effort is made to eliminate the noxious matters by the secreting cells of the kidney. The cells, in striving to separate the strange materials, become modified in their action and nutrition, and being rapidly thrown off into the tubes, are then removed by the current of liquid, and appear in an entire form in the urine. Meanwhile the process of secretion is checked, and this, probably, in two ways. 1st, It is likely that when the cells are engaged in separating any new material, which so far modifies them as to lead to the process of desquamation, they perform their functions less rapidly and completely than under ordinary circumstances, and, consequently, that the act of secretion receives a check from the moment that any material reaches the cells which requires this modified action—a retardation of the function of secretion which may be illustrated by the check given to the electric current, when, in one of the cells of a battery, materials having less affinity for each other are substituted for more active and efficient elements.

"2d, When the desquamative process has resulted, as it soon does, in the engorgement of many of the tubes with their accumulated contents, it is evident that in these tubes the process of cell-growth and of secretion must be greatly retarded, if not entirely arrested.

"The next point to be observed is, that, together with impeded secretion, there is, as a necessary consequence, retarded circulation. This subject is fully discussed in connection with that of chronic inflammation of the kidney. This subject is fully discussed in connection with that of chronic inflammation of the kidney, (Chap. IV.) to which the reader may refer. In this place it will suffice to state, briefly, that the process of secretion being interfered with, in the manner already described, and the blood, consequently, being imperfectly purified and freed from its excrementitious matters, the circulation through the intertubular capillaries is impeded, and the vessels which lie behind these, in the course of the circulation—the Malpighian capillaries and the arteries—become distended. Serum now escapes freely from the gorged Malpighian capillaries, and mixing with the urine, renders it albuminous, while the coats of the vessels begin to assume the opaque and thickened appearance before alluded to. Together with the serum, there is a transudation of fibrinous material, which coagulates in the tubes, and entangling on its surface some of the desquamated epithelial cells, and thence it escapes with the urine, in the form of the epithelial casts which have been already described. Further, some of the over-distended Malpighian capillaries, give way under the pressure to which they are subjected, and their contents escape into the tubes, some of the blood-corpuscles becoming entangled in the epithelial casts, and others being scattered through the urine, and contributing to form the dark-red sediment before described.

"In describing the morbid anatomy of the disease under consideration, mention was made of the patches of congestion which are commonly found in the mucous membrane of the pelvis of the kidney, as well as in the ureter and bladder. These appearances are, probably, the result of irritation produced by the contact of morbid urine with the parts in question, and they are associated with the frequent micturition and other signs of irritability of the urinary organs, which are so commonly present during the progress of the disease."—(P. 113.)

All this congestive and inflammatory state of the cortical or proper secreting portion of the kidney, necessarily causes, not only diminution of the natural secreted product of the organ, but the effusion and separation of parts of the blood, sometimes red globules, almost always albuminous parts. As, however, the congestion and inflammatory state subsides and disappears, the morbid and unnatural contents of the secreted product also disappear, and the secretion of urine is restored to its normal condition.

"When, under favourable circumstances, the morbid poison, which excited the renal disease, has been entirely eliminated, the desquamation of epithelium ceases, and the process of secretion again becomes normal, the blood is freed from its retained and accumulated excrementitious matters, the circulation through the kidney and throughout the body becomes free, the urine ceases to be albuminous, and the dropsy and other consequences of the poisoned condition of the blood disappear. We have already seen that the urine during the convalescence becomes abundant, and contains an increased proportion of liquid; the Malpighian bodies being, apparently, excited to profuse secretion of water by the stimulus of the desquamated epithelium which has accumulated in the tubes. This copious effusion of water is, probably, a reflex phenomenon, analogous to that of the rush of tears over the eye, in obedience to the stimulus of a foreign body on the conjunctiva. The purpose of the flow, too, appears to be the same in both cases—viz., to wash away materials which would otherwise impede the function and impair the structure of the organs concerned. The abundant flow of pale and watery urine continues until the tubes are cleared of their accumulated contents, and the ejected *débris* of epithelium are visible in the urine so long as this flushing process continues. Another explanation which may be suggested is, that the abundant secretion of urine is a consequence of the urea and the other urinary constituents, which having accumulated in the blood during the desquamative stage of the disease, and subsequently finding a free outlet, exert their natural diuretic influence. That urea is a powerful diuretic has been shewn by experiment."—(P. 114.)

This is the form of renal albumineccritic disease which takes place after attacks of scarlet fever, after common typhus, in acute dropsy, and after exposure to cold with errors in diet, and probably a considerable degree of intemperate living and irregular habits. At the same time, it must be allowed, that instances not unfrequently take place after thorough and continued exposure to cold and moisture, without previous irregular and intemperate habits, yet in persons in whom there has existed a long-continued state of susceptibility to the disease, which has thus been called into activity by the last exciting cause. The persons in which this mode of development is most frequently seen, are those of what is called the scrofulous habit. A mode of origin also not uncommonly observed is, when after an attack of scarlet fever, the patients are allowed to return too early to the use of animal food upon the idea of restoring strength. Instead of restoring strength, this mode of diet excites the vascular system, and especially the cortical texture of the kidney, while the skin is not yet in a condition to relieve the circulation by its secreting and excreting powers; and the result is an attack of acute Desquamative Nephritis.

The prognosis in this form of renal disease is upon the whole rather favourable. But much, if not all, depends upon judicious treatment. It is manifestly, in ordinary circumstances, a disease quite capable of cure. But to effect this, much attention to treatment, both medicinal and dietetic, is indispensably requisite.

The therapeutic method and its details given by the author, are done with skill and judgment. The great objects are, protection from cold; moderate, rather unstimulating diet; regular action of the bowels and skin; and above all, refraining from the use of those stimulating medicines called diuretics, which the author observes, are in all instances directly injurious. Iron, as a tonic, is useful after all symptoms of inflammation have disappeared.

In regulating treatment, it is important frequently to examine the urine by the microscope. This urine presents fibrinous casts of the uriniferous tubules; and as these are numerous or few, the physician forms his inferences as to the state and progress of the disease. As this sign is now so completely pathognomonic, Dr Johnson has thought it not unworthy of attention, to say a few words regarding the first observation and detection of these casts in the urine. It appears that they were first noticed in February 1842, rather more than eleven years ago, by Henle; and they appear to have been described in the course of 1843 by three observers separately, Simon, Scherer, and Vogel.

It appears further, that Frerichs has thrown some doubt upon the reality of the exfoliation or desquamation of the epithelial cells; and is of opinion, that the detachment of these scales is the effect merely of their being entangled in the fibrin. Dr Johnson, on the other hand, strenuously maintains the fact of the desquamation or exfoliation of these scales, of which he says he is as confident in belief as of the desquamation of epidermal scales.

The question appears to be of no great moment. Tubular casts are thrown off, and so also are epithelial scales.

II. The second form of albumineccritic renal disease is Chronic Desquamative Nephritis. This differs from the former in no respect, except that it is more chronic in its apparent progress and duration.

It is to be observed, first, that the acute disease occasionally passes, by imperceptible gradations, into the chronic form; and, secondly, that without any of the phenomena of the acute disease having taken place, the chronic form may be slowly and gradually established.

The principal symptomatic character of Chronic Desquamative Nephritis, is long-continued shedding of epithelium, which appears in the urine in a more or less desintegrated state. The tubules are gradually stripped of their epithelial lining, and subsequently become atrophied or filled with some new, and frequently an unorganised material; or they continue to be nourished, secrete serum within their cavities, and thus become dilated into cysts. The kidney, in the advanced stages, is commonly, but not invariably, much wasted; its substance firm, but its surface irregular.

The urine is for the most part albuminous, variable in quantity and specific gravity; but the former usually greater, and the latter less, than in the state of health.

This disease is frequently a consequence of chronic gout, or of some kindred disorder in the general health. It gives rise to great changes in the blood, and several various constitutional disorders consequent upon these changes, among which the most frequent and important are anasarca and dropsy of one or more serous cavities, inflammation of the serous membranes, hypertrophy of the heart, with or without disease of the valves, and lastly, organic changes or great functional disturbance in the nervous centres.

In one word, it may be said, either that this disease is a part and effect of chronic gout;—or Chronic Gout and Chronic Desquamative Nephritis, are the joint offspring of the same morbid condition of the system.

The urine in this form of disease should be examined when it is not turbid with lithates. When voided it is quite clear, and remains so after standing a few hours. Then, however, it deposits a sediment, dense and white, which looks like fine dust at the bottom of the vessel. Under the microscope this is found to consist partly of a scattered amorphous material, partly of the same material, in the form of cylinders, which have evidently come from the renal tubes, and which the author proposes to denominate *granular casts*. This granular material the author regards as disintegrated epithelium, which has become detached from the basement membrane of the tubes, and subsequently washed out with the urine; some of it retaining the cylindrical form, while part is irregularly scattered.

The following account of the state of the urine in this disorder is given.

"In the next, more advanced, stage of the disease, the urine commonly presents the following characters. During the attack of gouty inflammation in the joints, the secretion is scanty, and its specific gravity rather high; it is also albuminous, and continues so for a variable period after the gouty paroxysm is over, the albumen gradually diminishing in quantity, and at length disappearing entirely, until the next attack of gout brings with it a reappearance of the albumen. A microscopic examination now shews that during the time when the urine is albuminous, there is a more abundant shedding of disintegrated epithelium than in the earlier stage of the disease; the granular casts being numerous, and forming a rather copious, dense, whitish precipitate at the bottom of the vessel. The casts diminish in number simultaneonsly with the decrease of albumen in the urine, but at this stage of the disease they seldom disappear entirely; traces of them remaining throughout the intervals between the paroxysms, even when there is no admixture of albumen with the urine. The casts are sometimes obscured by a deposit of uric acid, or urate of ammonia, which at this period continues to be excreted in considerable quantities during and after the attacks of gout. In the intervals of the paroxysms, the urine is commonly more abundant than in health, of lower specific gravity, and of a somewhat paler colour. I have already said that the albumen disappears, but that the granular casts remain, though they are much less abundant than during, and for sometime after, the gouty paroxysm, when the renal desquamation is more active.

"We have here a series of phenomena indicating more advanced and more permanent diseases in the kidney, than during that which I have described as the first stage. For, 1*st*, during the general derangement which accompanies and follows the attacks of gouty inflammation of the joints, the increased number of granular casts shews a more active desquamative process, and the albuminous condition of the urine is evidence of a more impeded circulation; and, 2*d*, during the intervals of the gouty paroxysms, the continued presence of the granular casts, though in diminished numbers, shews that the kidneys are constantly excreting some of the morbid matters with which the system is becoming saturated, and of which the so-called 'chalky' deposits, which now often begin to form in the joints and elsewhere, afford one kind of evidence."—(P. 181.)

The description of the various symptoms, and the state of the different functions, we pass over; and give the following extract on the morbid anatomy and pathology of the diseased organ.

"The kidneys are then of the natural size and weight, and they present to the eye no appearance of disease, or there may be some irregular congestion on the capsular surface, but the lobular markings are distinct and natural; one of the surest outward signs that there is not much structural change in the organ. On a microscopic examination, the only deviation from the normal appearance is in the epithelial cells of the convoluted tubes. These are opaque, and have an unusual, finely granular appearance; in some tubes there is an appearance of entire cells having been shed so as to fill the tubes and render them opaque; while in others there is an equal filling and opacity of the tube, from containing epithelium in a disintegrated condition, and which has become so either from the crumbling of the cells while they are still attached to the basement membrane, or from the disintegration of the epithelial cells which have accumulated in the tubes after being shed in an entire form by a process of desquamation. In most cases it is probable that the cells become disintegrated by both the processes here described, but in other instances, which are comparatively rare, many of the tubes are seen to be filled with disintegrated epithelium, but in none of them is there any evidence of the true desquamative process; in other words, none of the tubes contain entire epithelial cells which have been shed and detached from the basement membrane."—(P. 210.)

The further progressive course of this stripping and denuding process in the tubules is described by the author in the following manner; and he eventually shews by what mechanism the vesicular cysts of the kidney may be formed in this disease.

"We have now to examine the condition of the tubes subsequent to the denuding process above described. Apparently the most common result of the destruction of the epithelium, is the gradual wasting of the tube. The tubes may always be identified by the peculiar manner in which they are packed in the meshes of the matrix, and also by the appearance of their contents; a few broken and scattered particles of the epithelium adhering still to their inner surface, and rendering it easy to trace them dwindling down from their normal size to an almost invisible degree of minuteness. The addition of acetic acid will sometimes clear the specimen and render the tubes more distinct. In consequence of the wasting of the tubes and the collapse of the surrounding tissues, the Malpighian bodies are brought closer together, so as to appear relatively more numerous, and sometimes three or four of them may be seen almost in contact with each other. I shall have again to refer to this wasting of the tubes, but it will not be out of place to remark here, that as the epithelium is the essential part of the tube, and as its normal action upon the blood is necessary for the maintenance of the circulation, so the decay and atrophy of the tubes appear to be a natural consequence of the destruction of their epithelial lining. It is probable that when the tubes continue to be nourished after the removal of their normal epithelium, this is associated with some modified secretion of growth within them. I have sometimes thought that the abundant secretion of urine of low density, which is so commonly associated with this form of renal disease, might be in part explained by supposing that some of the tubes, when denuded in the manner described,—having lost their normal epithelium, and with it the power of secreting the solids of the urine,—may yet continue to pour out a watery secretion, which would dilute the urine and diminish its density. Another explanation of thus abundant flow of watery urine is one which I have before suggested,—viz., that the particles of epithelium which are thrown into the tubes stimulate the Malpighian bodies and excite them to pour out a current of liquid, the purpose being to wash away the *débris* and clear the tubes.

" The materials which are occasionally found in the degenerated tubes are, first, an unorganised fibrinous or albuminous material; second, oil; and third, serum.

" The albuminous or fibrinous material is the same which forms the ' large waxy casts' which have been already mentioned. It appears to be the result of the last remains of secretory power; a power which suffices to separate materials from the blood, but not to organise them into cells. This material accumulates in very different degrees in different cases. Occasionally the desquamative process may pass through all its stages, and accomplish the complete destruction of the kidney, without any appearance of this peculiar deposit either in the urine or in the kidneys. In other cases there is only sufficient in the urine to indicate the nature and the stage of the renal disease, and the kidneys contain but small quantities; while again, in other instances, this material is very abundant in the urine, and the kidneys contain it so largely that they have a yellowish-white, wax-like appearance. There can be little doubt that the material in question is secreted by the basement membrane after the destruction of its epithelial cells. In the case of Revels, its first formation in the kidney was indicated by the appearance in the urine of the waxy casts, which rapidly increased in number until they became more numerous than the granular casts which had previously existed alone.

" A deposit of *oil* in the denuded tubes is not an uncommon occurrence, but it is observed in only a very few of the tubes. The oil sometimes appear to be contained in cells, but more frequently it is in clustered masses, having much the appearance of ordinary adipose tissue. The tubes sometimes appear distended and dilated by their fatty contents, and it is probable that they may grow together to an indefinite extent, and that this is the origin of those cysts which, as large as a hazel-nut or a walnut, are sometimes filled with fatty matter.

A third condition in which the tubes are often found after losing their normal epithelial lining, is one of dilatation, a process which appears to be associated with the secretion of serum into their cavities, and which continues until they become visible to the naked eye and form the cysts, which in variable numbers and of different sizes are amongst the most frequent results of chronic inflammation of the kidney.

"It appears that the normal epithelium is never reproduced in those tubes which, having once become quite deprived of it, are thus entirely denuded. But occasionally there may be seen some tubes which are lined by a layer of very delicate, transparent, nucleated cells, such as may be supposed to secrete a serous or watery liquid, and these cells appear to have taken the place of the normal epithelium. The tubes which have this peculiar lining are either of the normal size, or, what is perhaps more common, they are larger than ordinary tubes, and appear to be undergoing a process of dilatation. I do not remember to have seen these cells in any tubes below the natural size, and which I suppose to be diminishing from atrophy. It appears, therefore, a reasonable inference that the cellular lining in question is an evidence of life and growth in the tubes which possess it. I am not certain whether these cells are necessary for the secretion of serum into the tubes, or whether the denuded basement membrane alone has this power of secretion, but I think it probable that the cells are always present in the early stages, and that, subsequently, when the serum accumulates and dilates the tubes, their cellular lining becomes flattened and inconspicuous.

"There is no difficulty in tracing the tubes through every degree of dilatation, from the normal size up to cysts visible by the naked eye. The peculiar appearance which the fibrous matrix gives to the tubes, is rendered still more striking when the tubes, having lost their epithelial lining, become transparent. In this condition, as they are alternately visible in the meshes and concealed by the fibres of the matrix, they have so much the appearance of globular and oval vesicles, that no one who saw them for the first time could do otherwise than mistake them for such. There is but one mode of avoiding this error, and that consists in comparing the appearances of the healthy kidney with those of the diseased structures. The fibrous matrix should first be examined apart from the tubes; then thin sections of kidneys with the tubes in various conditions,—containing blood, opaque with desquamated epithelium, empty and denuded, or lined by newly-formed transparent cells. The tubes in every condition will present, here and there, the same delusive appearance of being in detached, circular, or oval portions; and if in one condition alone they look like cysts, this is merely because they are transparent only when empty and denuded, while in their arrangement and in their relations to the matrix and to the bloodvessels they have all the marks by which they may be identified with the tubes. A careful examination will always detect, in immediate contact with the cyst-like appearances, unequivocal portions of elongated tube having the same structure and contents as the other parts, and evidently identical and continuous with them, the continuity only being concealed by the fibrous tissue in which they are packed."—(P. 219.)

The question of the mode in which these vesicular cysts are formed, has given rise to some difference of opinion;—Mr Simon, Rokitansky, and Mr Paget, giving a view different from that of Dr Johnson. For their reasoning on this question, however, which, in its present state, is more curious than useful, we refer readers to the work itself.

The essential nature of this disease is that of Atrophy of the kidney. The author is of opinion that a progressive chronic desquamation involves all the tubes in its attendant Atrophy, while the arrest of the disease after a certain number of tubes have been denuded is favourable for their conversion into cysts. The conjunction of the two processes formerly noticed of breaking up of the cells and their exfoliation, and the disintegration of the epithelium, lead to the wasting of the kidney. This process takes, at an average, a period of not less than six months; but it may be extended over years.

These changes lead to, and are certainly accompanied or followed by, great changes in the exterior of the kidney, that is to say, in the cortical portion, which usually becomes hard, shrivelled, and smaller than the normal size; in short, wasted and atrophied. The arteries are then thickened and tortuous, and their walls are indurated from chronic inflammation. The minute capillaries of the *corpora globosa*, after having been first congested and distended so that several of them burst, become also thickened and indurated; and subsequently many of them are rendered so impervious that they are no longer capable of maintaining the circulation; and hence they are shrunk, and atrophy follows as a necessary consequence. The veins are stated to be changed in the same manner.

The author is at great pains to explain the manner in which the urine becomes albuminous, and the cause of the induction of dropsy in this disease. We know not that it is possible to explain all the effects to which the disease gives rise. It is certain that it either produces great and serious changes in the constitution of the circulating fluid, or that the same cause which produces the diseased state of the kidney induces these changes, and at the same time serious changes in the heart and its valves, and throughout the whole arterial system. But whether it is possible, to explain the occurrence of albuminous urine and dropsy with greater facility, than by referring them to the general disorder of the entire vascular system, is a point which for the present must, it appears to us, be left a question open for further inquiry.

Dr Johnson gives a just view of the prognosis in this disease, and the treatment to be pursued. The main objects in treatment are to reduce the rate of diet to the exigencies of the system; to restrict and regulate the amount of food to be taken; to amend the action of the skin by suitable clothing, the use of the warm bath, protection from cold, and removal if need be, to a dry, rather warm climate; to abate the congestive and inflammatory state of the kidneys by occasional local bloodletting by means of cupping, and by revulsion by means of frequent blisters, or the use of the seton. The author is averse to the use of blisters and the employment of liniments containing turpentine, from the apprehension that they may irritate the tubular and calycine part of the kidney. An easy method to obviate the bad effects of the cantharides of the blister is to keep it applied only five hours, and then apply over the surface a cloth well covered with resinous ointment.

Dr Johnson speaks rather favourably of the use of mercury in the treatment of this disease, especially that of the dropsical effusion. The use of this medicine, however, requires extreme caution in patients labouring under this disease.

III. The third form of albumineccritic renal disease is that which Dr Johnson terms Waxy Degeneration of the Kidney.

The characteristic symptom of this form of disease is the discharge in the urine of waxy casts, often large, sometimes moderate, or even small in size. (See page 352.)

The appearance of a few large waxy casts during the course of Acute Desquamative Nephritis is a common occurrence; but the number is small in comparison of the epithelial casts. All the patients in whose urine Dr Johnson observed these casts together with the epithelial casts, recovered; so that no opportunity of examining the state of the kidneys was afforded. He entertains no doubt, nevertheless, that were any case in which they had taken place, to proceed to the fatal termination, some of the tubes would be found filled with the waxy material; and he thinks it clear that those portions of the tubes, which contain the material in question, must have been stripped of their epithelium, since the casts have the full diameter of the uriniferous tubes.

These waxy casts, however, may be voided in the urine without any epithelium, as is shewn by cases adduced. It appears, also, that the occurrence of these waxy casts is sometimes observed in connection with other diseases, especially disease of the liver, of a scrofulous character. It appears to be often a secondary consequence of other affections, both of the kidney and perhaps of other organs.

The specific gravity of the urine varies considerably. In some instances it is low; commonly it is near the ordinary standard, and in one case given by Dr Johnson, in which the secretion was scanty and the albumen copious, the density ranged from 1024 to 1030. The quantity of urine secreted is usually below the standard of health, and the albumen is in most instances abundant. In short, in colour, amount, density, and in the proportion of albumen, the urine secreted by the kidneys in this state of Chronic Waxy Degeneration differs from that of Chronic Desquamative Nephritis, and makes a near approach to that state of the urine which occurs in connection with Non-Desquamative Disease of the Kidney, and Granular Fatty Degeneration of the Gland.

From all that is stated concerning this condition of the urine, it appears hitherto very doubtful whether it ought to be regarded as indicating the existence of a distinct substantial, essential disease of the kidney. It is perfectly proper to give the condition of the urine when containing these waxy coats, sufficient consideration, probably separate consideration, as a pathological phenomenon. But Dr Johnson himself allows that the urine makes a near approach to that of the two forms next to be noticed. It appears, further, that these waxy casts take place very often in the acute form of Desquamative Nephritis; and if the occurrence of these casts is to be regarded as indicative of a separate pathological essential condition, it appears more than probable that the time for advancing such a distinction has not yet arrived. At present, waxy casts must be regarded as belonging to several diseased states of the kidney. After making these remarks upon this subject, we leave the arrangement in the form in which Dr Johnson has given it.

IV. The fourth form of these renal diseases is that to which the author applies the name of Non-Desquamative Disease of the Kidney. As in the first and second forms, the leading character is the exfoliation or desquamation of epithelium from the uriniferous tubules, the object of the morbid action being the elimination of certain abnormal products from the blood, so in this form the Kidney is in a state of congestion and inflammation, yet without exfoliation of epithelium from the tubules taking place.

Dr Johnson endeavoured to shew, in regard to the first form, Acute Desquamative Nephritis, that the abundant shedding of epithelium by which that form of disease is distinguished, is the result of a salutary effort to eliminate from the blood certain abnormal products, which, if retained, would be attended by injurious consequences; while their escape from the blood is probably facilitated by the free exfoliation of epithelial cells, much in the same manner as the elimination of the poison of scarlet fever is facilitated by the desquamation of the cuticle.

Supposing this view to be well founded, it would follow, if it further be admitted that there is a poison to be eliminated from the blood, that Non-Desquamation is an unfavourable symptom. It scarcely appears, nevertheless, that the reasoning of the author takes this direction. All that he says is, that in certain instances exfoliation may be excessive, and the epithelial scales may so fill up the tubules as to obstruct them entirely; much as an excessive eruption of smallpox may produce so much fever and inflammation as to put an end to life; and as profuse discharges in cholera may, while it eliminates the poison, eliminate also the soul from the body of the patient.

Dr Johnson then reminds his readers, that it is most important to distinguish the forming and essential cause of a disease from those outer and visible manifestations of its presence, which are in many instances the means which nature employs to remove the evil, or to obviate its injurious effects. It is not very easy to perceive the connection between this remark and the subsequent statements of the author. Dr Johnson, though he does not exactly say, that he had not perceived the distinction now mentioned, allows, however, that he had on several occasions given a more favourable prognosis of the Non-Desquamative Disease than subsequent experience had proved to him was proper. He believed that when the urine, though scanty and albuminous, is free from sediment, and contains neither casts of tubes nor renal epithelium, the condition of the kidney is one merely of congestion or functional disturbance, and therefore favourable for the recovery of the patient.

So far as we understand the train of reasoning adopted by the author, it amounts to this. Non-Desquamative Disease of the Kidney, congestive or inflammatory,—for in our opinion positive inflammation is not necessary to constitute any one of these morbid states,—is a very dangerous and serious disorder; in so far as it shews, that the noxious matter presumed to lurk in the circulation is not eliminated, at least not freely eliminated. The occurrence of small casts which takes place in this form of disease, and the presence of albuminous urine, shews that an effort is made to get rid of some noxious matter; but as no epithelial scales are observed, this proves that no desquamation or exfoliation takes place, and when this is the case, the discharge of the hurtful matters is less free and perfect than is requisite for the exigencies of the system.

Dr Johnson gives, at pages 356 and 357, an explanation of the phenomena of the disease, as they were observed to take place in one instance of this form of disease. The most important circumstance in this explanation is, that the appearance of small waxy casts is represented to be a favourable circumstance, as one which indicates greater facility for eliminating morbid and detrimental materials. In short, the whole amounts to this, that hæmorrhage from the *corpora globosa*, causing the appearance of blood, and albumen in the urine and waxy casts are favourable indications; and albumen, without epithelial scales or casts, is an unfavourable indication.

Non-Desquamative Nephritis may be either Acute or Chronic.

The specific gravity of the urine varies considerably. It is seldom low; frequently it is up to, sometimes above, the healthy standard. But the daily discharge of solids by the kidneys is almost constantly below the normal amount. The quantity of albumen varies according to the intensity of the disease; but in a large proportion of cases it is very abundant, so that the urine, when boiled, becomes almost solid. The urine has usually an acid reaction. Microscopic examination shews the urine to contain neither casts of tubules nor renal epithelium. In some cases, scattered blood *corpuscula* may be present; but this is not common; and a copious sediment of blood, either in the shape of blood-casts, or otherwise, is still more rare. Small waxy casts are seen, not constantly, but at occasional intervals.

The state of the kidney in this form of disease has been so often described, that to this it is unnecessary here to recur. It is sufficient to say that to this category belongs the kidney rather large and heavy, with a peculiar wax-yellow colour of the cortical substance. The bloodvessels are in general not very pervious, sometimes, in advanced cases, impervious. The renal veins are filled with clots. Almost all the phenomena lead to the inference that the glandular tissue, that is to say, the cortical tissue, is in a state of simple hypertrophy.

"It is assumed," says Dr Johnson, "with great degree of probability, and for reasons which have before been referred to, that the proximate cause of the disease in question is the admixture with the blood of some new materials, which, not finding a free outlet by the ordinary process of renal desquamation, tend to embarrass the circulation through the kidney, and also to accumulate in the blood, together with some of the normal constituents of the urine, whose elimination would of necessity be retarded simultaneously with that of the morbid materials with which they are associated. This accumulation of excrementitious materials in the blood will act as stimulus to the increased growth and development of glandular tissue; for the tissues in question may be said to feed upon the materials for which they have an affinity, and the growth of a gland is in proportion to the quantity of its proper secretion with which it is supplied by the blood. This appears to be the physiological explanation of the double size of a kidney which has to discharge the functions of two glands, as well as of the increased bulk of the kidneys, which occurs when their secreted products are modified by the admixture of some morbid materials which are very difficult of elimination."

The author afterwards remarks (p. 368), that it will be understood from what has been already said, that hypertrophy of the secreting tissue is not a constant effect of the Non-Desquamative Disease. The conditions which appear to be necessary for such a result are a degree of morbid alteration of the blood, and such a duration of the disease as may suffice for the growth of new tissue. In short, what may be congestive and obstructive only in the renal vascular system, in the early stage of the disease, becomes hypertrophy and disorganization in the advanced stage.

V. Next comes Fatty Degeneration of the Kidney. By this Dr Johnson distinguishes two varieties; the first, Granular Fatty Kidney; the second, Mottled Fatty Kidney.

These constitute the ordinary forms of STEATOSIS, or Fatty Degeneration of the Kidney, now long known under various denominations, as Granular Degeneration, Mottled Kidney, Bright's Disease, and similar denominations. They have been often under consideration in different volumes of this Journal; and the principal ideas of Dr Johnson, with those of Mr Toynbee, were brought under notice at sufficient length in the article already referred to, in volume sixty-eighth. It is therefore quite unnecessary at present to recur to the subject, as this would involve some repetition.

Those forms of renal disease now mentioned are all that can justly be said to be associated with what may be named Idiopathic Albuminous Urine. In the other forms, the presence of that principle in the urine is the effect, either of suppuration, or of mechanical irritation from the presence of calculi in the kidneys, or of cancer, or some similar heterologous growth. These, therefore,—excepting, perhaps, the first,—belong to another division of the subject.

Hitherto we have not touched upon the causes, real or supposed, of these forms of renal disease. Into this subject both Dr Rees and Dr Johnson have entered fully. The only point strongly deserving attention, perhaps, is the circumstance, that Dr Rees, as our readers are probably aware, lenies, rather in a decisive manner, the influence of mercurial medicines in producing albuminous urine and renal disease. It is true that Dr Rees maintains this proposition upon the ground of extensive and rather numerous experimental trials made in the wards of Guy's Hospital, as is known to those who are in the habit of perusing the instructive reports of that institution. The correctness of the proposition, in the terms stated by Dr Rees, it is not our intention to call in question; but there are two points in this inquiry, which we think may be regarded as, if not in all instances, at least in many, so well established, that it is difficult to believe, that there is not in them a certain amount of truth.

The first is this;—that, after two or more courses of mercury, whether to salivation or not, but courses of mercurial medicine in such a manner as to impregnate the system, the urine often becomes albuminous; and, whether it do so or not, patients who have been subjected to this mercurial discipline, evince great readiness, under errors in diet and exposure to cold, to be attacked by one or other form of renal disease. This we have witnessed so often, that we would require much counter-evidence to destroy its effect.

The second point is this;—that, in patients in whom renal disease is already established, mercury given in very small quantity speedily affects the system; and when it affects the system, it produces, in a large proportion of instances, the most hurtful effects. The gums in such patients are most easily affected; diarrhœa is induced, and proceeds to an alarming degree of intensity and severity; and not few patients are cut off,—certainly contrary to the expectation of both medical attendant and friends,—in an incredibly short space of time, and in a manner to them equally incomprehensible and surprising. Cases of this description are of frequent occurrence; and the suddenness with which the fatal event ensues,—often in the course of one day, or not much longer, from the first appearance of the mercurial action,—

has more than once given rise to strange suspicions and inquiries, which only the knowledge of the fact now mentioned furnishes the means of explaining.

On the subject of other causes, we have little to say. That of the use of alcoholic drinks is admitted by both authors. It would be most profitable to the human race, if the pernicious effects of these stimulants in producing various forms of renal disease, were more fully and perfectly understood. If the moderate and systematic spirit-drinkers,—those who think that a glass of spirits and water at or after dinner is necessary to enable them to digest articles, which they ought not to have eaten, and another glass in the evening is requisite to make them sleep sound,—could be made to understand what mischief they were doing to the structure of the kidneys; that in no long time albuminous urine, a swelled face and legs, rejection of food, diarrhœa, and death by stupor, were awaiting them, surely they would pause in that career, which was leading them, by steady and progressive steps, to the tomb.

Dr Johnson has spoken much and justly of poison present within the system, as the cause of renal diseases, and which requires to be eliminated. In a large proportion of instances, the poison is voluntarily taken in as food and drink, especially in the form of highly-dressed articles of food and stimulating drinks. By eating food which the stomach cannot digest and apply to the purposes of nutrition, and then imbibing alcoholic drinks to aid in this laudable undertaking, the human race daily prepare within their own persons poisonous articles, which, when present in the blood, irritate the secreting glands, and throw them into a state of disease.

So much have we had to say of the work of Dr Johnson, which is altogether most excellent, and ought to be carefully studied by every physician, that we have not had room to speak of the Treatise of Dr Miller on Disease of the Kidney in Scarlet Fever. It is therefore our duty to say that it presents a most correct and instructive view of the disorder, and reflects great credit on the talents and knowledge of the author.

The volume by Dr Owen Rees forms an excellent manual on the Albuminiferous Diseases of the Kidney, and the high character of the author as a chemical pathologist cannot fail, with its own merits, to recommend it to attention.

The Appendix contains an instructive account of the physical and chemical properties of the blood, and the best mode of shewing the vesicular structure of the *Corpuscula*.

ART. III.—1. *An Introduction to Practical Chemistry, including Analysis.* By JOHN E. BOWMAN, Demonstrator of Chemistry in King's College, London. London, 1848. 12mo. Pp. 280.

2. *The First Step in Chemistry.* By ROBERT GALLOWAY, F.C.S., Lecturer on Chemistry, Putney College, formerly Chemical Assistant in the Museum of Practical Geology. London, 1851. (June.) 12mo. Pp. 91.

3. *A Manual of Elementary Chemistry, Theoretical and Practical.* By GEORGE FOWNES, F.R.S., Late Professor of Practical Chemistry in University College, London. Fourth Edition, revised and corrected. London, 1852. (September.) 12mo. Pp. 681.

4. *A Practical Handbook of Medical Chemistry.* By JOHN E. BOWMAN, F.C.S., Professor of Practical Chemistry in King's College, London. Second Edition. London, 1852. (October.) 12mo. Pp. 261.

These publications promise to be highly serviceable to the student, whether upon commencing the systematic study of Chemistry in general, or when attempting to make its applications to the purposes of physiology and pathology.

The First Step in Chemistry, by Mr Galloway, is a short treatise, entirely rudimental and elementary. But it gives a view of chemical elements and actions so clear and simple, and conveys so much accurate and useful information in so small compass, that it deserves to be strongly recommended to the student in chemistry.

In the first chapter an account of the most important chemical elementary substances is given, with general remarks on the properties of metals and the action of acids upon them.

In the second chapter, the compound substances are classified; in the third, the combining proportions are considered and explained; in the fourth, acids and their properties; in the fifth, salts, neutral acids, basic, and polybasic. The sixth chapter is devoted to the formation of chemical formulæ, and exercises on this subject. The seventh treats of electric affinity, illustrated by exercises on that subject. In the eighth chapter, are explained the conditions under which combination and decomposition take place, with exercises, and tables, shewing the relative solubility of oxides, hydrates, and salts. In the ninth chapter is given the method for determining the amount of the several constituents contained in a given quantity of any compound; followed by exercises. And the tenth chapter is occupied in shewing the mode of determining the relative proportion of the elementary actions in any chemical compound; and the method for deducing their relative and absolute numbers; each illustrated and exemplified by exercises.

It will be seen from this short notice, that the present volume ought to be of great service in initiating the student in many important details of practical Chemistry.

The Practical Chemistry of Mr John E. Bowman is more ample in details, and is evidently intended for students at a more advanced stage of progress in the study of chemical manipulation. The work is manifestly intended for the Laboratory, and to be used as a guide in conducting various chemical processes and technical applications. The preparation of various chemical elements and agents, working in glass, the multiplied uses of the blow-pipe, the methods of ascertaining specific gravities, the means of ascertaining the proportions of acids and alkalies in various articles; in short, all those numerous minute operations, which the chemist is daily called on to perform, besides the rules for performing analyses in the most accurate manner; all these form the subjects of the volume by Mr Bowman.

To the work is attached a valuable Appendix, containing Tables of the relative values of the foreign Measures and Weights, Tables of Specific Gravities, of Freezing Mixtures, and many things important to be known to the practical chemist.

The Practical Handbook of Medical Chemistry is a work more immediately intended for the use of the medical student and practitioner.

It is a work, in short, upon Animal Chemistry, and the best methods of shewing the tests for the presence of poisons.

The volume is divided into five parts, in each of which are fully delivered the chemical history of the following subjects:—I. The Urine, in its healthy and morbid states; II. Calculi and Concretions, Urinary, Biliary, Arthritic, or Gouty; III. The Blood, in its healthy and morbid states; IV. Milk, Mucus, Purulent Matter; Bone; the Examination of Mixed Animal Fluids; and V. The Detection of Poisons in Organic Mixtures.

On all these subjects Mr Bowman places before the reader the most accurate and the most recent information, in a condensed but distinct form. This volume is one which cannot fail to be most useful to the medical practitioner, who, in the present time, requires to possess at least a certain amount of accurate knowledge on the chemical relations of the various fluids and solids of the animal body.

The Manual of Elementary Chemistry, by the late Mr George Fownes, is a work of which, upon a former occasion, when in the second edition, a favourable judgment was given in this Journal, volume sixty-ninth, p. 240, January 1848. The merits of the book, as a short useful manual, were so fully recognised, that in 1848, that is the same year, it was found necessary to prepare a third edition. In this duty the author was occupied diligently, though then labouring under the disease which in January 1849 carried him off. Mr Fownes himself had finished the most important part of Organic Chemistry, in which the greatest number of additions were required, when he found his strength so much impaired, that he was unable to do more. The completion of the work he delegated in this state to his friend Dr Bence Jones, who made a few alterations in the Animal Chemistry,—the only part which Mr Fownes had been unable, from his extreme weakness, to alter. The work, nevertheless, did not appear until January 1850, nearly twelve months after the death of the author.

It is extremely creditable to the skill and talent of this promising Chemical Teacher, that three years after his death, in a science so rapidly advancing, so comprehensive, and so expansive as chemistry, it should still be found eligible to republish this work. Had life been prolonged, it is not to be doubted. that, as in 1848, he would, in 1851 and 1852, have laboured with assiduity to accommodate the work to the actual state of chemistry as a science and as an art. This has been the endeavour of Dr H. Bence Jones and Mr A. W. Hoffmann, the Editors of the fourth edition, at present before us.

This duty the Editors have accomplished with the ability that might be expected of them. It is easy for those who attend to the progress of chemistry, to understand that considerable additions, and not few modifications, would require to be made in the three years, between the beginning of 1849 and September 1852. All this has been done in a very creditable manner by the present Editors, who have devoted particular attention to, and taken great pains with, that part of the work which relates to Organic Chemistry.

It comes not within our plan to enter into detailed examination of a work like the present; but it is our duty to say, that as a Manual of Chemical Knowledge, presenting a just view of the present state of chemical facts and chemical doctrines, it is entitled to the highest character.

ART. IV.—1. *A Treatise on the Practice of Medicine.* By GEORGE B. WOOD, M.D., Professor of the Theory and Practice of Medicine in the University of Pennsylvania; President of the College of Physicians of Philadelphia; one of the Physicians of the Pennsylvania Hospital, &c. Third Edition. In Two Volumes 8vo. Volume I., pp. 857. Volume II., pp. 853. Philadelphia, 1852.

2. *The Modern Practice of Physic; exhibiting the Symptoms, Causes, Prognostics, Morbid Appearances, and Treatment of the Diseases of all Climates.* By ROBERT THOMAS, M.D. Eleventh Edition, thoroughly Revised, Corrected, and to a considerable extent Rewritten, by Algernon Frampton, M.D., Cantab. Physician to the London Hospital. In Two Volumes. London, 1853. 8vo. Vol. I., pp. 755. Vol. II., pp. 564.

Though the booksellers of the United States republish a considerable number of English Medical works, this is not caused by any want of indigenous American talent or learning. In the seventy-fifth volume of this Journal[1] it became our duty to direct attention to a work on the Practice of Medicine, produced by George Baché Wood, a native of the United States, and Professor of the Theory and Practice of Medicine in the University of Pennsylvania. The work was one, on which we could justly speak in terms of commendation, both as to its arrangement, the information which it conveyed, and the details of its several divisions. The work, as was mentioned, consisted of two Great Divisions; one devoted to the subject of General Pathology; the other to the subject of Special Pathology and Therapeutics. While it must be allowed that this furnishes the only philosophical mode of treating a branch of Medical Science so extensive and important as that of the Practice of Medicine, we were enabled conscientiously to say, that the work had been prepared with great ability by the author, and that it promised to be proportionally serviceable to the student and practitioner of Medicine.

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[1] Edinburgh Medical and Surgical Journal, Volume seventy-fifth, January 1851, p. 218.

Since the time to which we refer, or rather since the year 1847, when the work was first published, it has gone through a second edition; and the third edition, which bears the date of April 1852, is now before us.

It must be superfluous to repeat, at the present time, the terms of the character which we thought it proper to give the treatise in 1851; for probably the least equivocal proof of the value of the work, is, that in so short a space of time as five years it has gone to a third edition. This amount of public favour is certainly merited. All good and equitable judges will allow that the Treatise of Dr Wood is a highly creditable production; and if it be the first attempt of the Americans in this way, it can scarcely be doubted, that the number of American reprints of English medical works will be diminished.

It is very true that a considerable proportion of the work is compilation; but this it is altogether impossible to avoid; and when it is observed, that the compilation is skilful, and on the whole judicious, it is manifest that the most rigorous judge can require no more.

The long time during which the work of the late Dr Robert Thomas has been in the hands of the profession, shews that it must have possessed considerable merits as a convenient and useful system of medical knowledge. It was originally published in 1802, fifty-one years ago; and while in the course of years between that time and 1820, and even later, it was by far the most popular and generally read work,—indeed almost the only one,—it has since that time kept a considerable hold of professional opinion, and, amidst not few rivals, it is still highly esteemed.

When it was first published in 1802,[1] the principal competitor which it had to encounter was the First Lines of William Cullen and the London Practice of Medicine; and probably it may be added, the work entitled the Edinburgh Practice of Physic. This last work, which was originally the Articles Medicine and Surgery in the early editions of the Encyclopædia Britannica, was in many respects an estimable and useful Treatise. The Nosological arrangement and distinctions were chiefly those of William Cullen, with some additions and interpolations from the *Nosologia Methodica* of Sauvages. It was at first short, condensed, clear, and upon the whole correct in theory and practice. It had preceded the work of Dr Thomas; but after being enlarged, which it was eventually to five octavo volumes,—which, however, included a Treatise on Midwifery,—it lost ground apparently, as it was enlarged in extent.

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[1] The Modern Practice of Physic, which points out the Characters, Causes, Symptoms, Prognostics, Morbid Appearances, and Improved Method of Treating the Diseases of all Climates. By Robert Thomas, M.D. In two volumes. Vol. I., pp. 488. Vol. II. pp., 442. London, 1802. 8vo.

The work of Dr Thomas appeared in 1802, in two volumes of moderate size, and professing to give a full view of the Practice of Medicine in this condensed shape, with other qualities which it possessed, it speedily became popular among the great body of students and practitioners in medicine.

The circumstances that contributed to its popularity were undoubtedly that, in arrangement and nomenclature, in classification and distinction, it was founded upon the Nosology of William Cullen, and that it contained in the descriptions and theory of diseases all the best parts of the First Lines of the same author; while in many points in etiology, in treatment, and in the practical application of remedies, it conveyed information greatly more recent, and well suited, upon the whole, to the mental qualifications of the great majority of the medical profession.

A great recommendation of the work of Dr Thomas was, that, discarding all speculations, or reducing them to the smallest possible dimensions, it gave the medical practitioner at once upon the symptoms and the treatment of diseases, the kind of information which he immediately and principally required. Then, if he was at a loss for a medicine to be prescribed, a mode of exhibition, or a formula for its preparation, a department entirely disregarded by Cullen, the prescriptions and formulas in the work of Dr Thomas instantly supplied what was wanted. In this way it came to pass, that, whether the First Lines of Cullen were read or not, invariably the Practice of Dr Thomas was read once and again, and was consulted probably twenty times for once that the First Lines were studied. The First Lines was certainly a more philosophical, a more scientific performance, and was the favourite of the small proportion, who could form a just estimate of its merit; but it was deficient in those qualities which recommend a work to the great body of practitioners, who have little time to read, and almost none for thinking and reflection. To this large division of the profession the work of Dr Thomas was peculiarly well suited by the circumstances already mentioned. The result was, that, for at least the first quarter of the present century, the Practice of Dr Thomas was the principal work, which the medical student could peruse during the course of attendance on lectures, and the common one which the practitioner believed it indispensable to possess as his guide in practice. On the 1st of May in the year 1816, it had arrived at the fifth edition.

In the progress of years, however, various changes took place. The Practice of Medicine by John Mason Good was a work upon a more comprehensive plan, and upon the whole had a greater appearance of method and scientific arrangement than that of Dr Thomas. Other writings followed, more deeply and thoroughly imbued, perhaps, with the spirit of the modern improvements in Pathology and Practice. The work of Dr Thomas, nevertheless, by its complete form and its practical business-like character, still kept possession of a certain proportion of the field; and even now, many years after the death of the author, it has appeared in the eleventh edition.

The last edition of the Modern Practice of Physic that was published by the author was the tenth, which appeared in the year 1836[1], when the author was in the eighty-second year of his life. Dr Thomas died not long afterwards; and the next edition required to be prepared by another editor. The proprietors, accordingly, in the year 1846, entered into an arrangement with the late Dr Algernon Frampton, Physician to the London Hospital, for the preparation of a new and thoroughly revised edition of the work.

It must nevertheless be observed, that the present work cannot be with justice called the Practice of Dr Thomas. It could not, indeed, be so, after the lapse of ten years, much less after that of seventeen years. The present, though retaining much of the original form, and, perhaps the substance, we pretend not to say how much or how little, is to be regarded as a work in a great degree and to a large extent new. Its personal identity, as it may be said, if not entirely lost, is at least, greatly changed, much modified. All this was requisite to accommodate a work written in the beginning of the present century, and adapted by the author to the state of medicine in 1820, 1824, and 1836, to the state of the same science in the year one thousand eight hundred and fifty-three.

The present edition has been prepared principally by the late Dr Algernon Frampton, the learned and well-informed Physician to the London Hospital. No doubt can be entertained that Dr Frampton was, by preliminary education and the professional opportunities for improvement which he enjoyed, extremely well qualified for the duty of editing a work on the Practice of Medicine suited to the exigencies of the present time. Educated at Harrow and Cambridge, he became, in 1832 Assistant Physician to the London Hospital, and in 1844, one of the Physicians to that institution. All these advantages, however, which gave promise of increasing the amount and enlarging the field of his professional and social utility, were rendered abortive by early death. In the course of the year 1851, when Dr Frampton had already advanced far in the progress of his work, he was overtaken by disease, which put a period to his life in December 1851. At this time the whole of the first volume was either printed, or in the hands of the printer; and a considerable portion of the second volume was more or less ready for the press. The manuscript copy, however, had not been continuously prepared; and several articles were not printed.

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[1] The Modern Practice of Physic; exhibiting the Character, Causes, Symptoms, Prognostics, Morbid Appearances, and Improved Method of Treating the Diseases of all Climates. By Robert Thomas, M.D. London, 1836. September.

The result of this was, that it became necessary to make arrangements with several of the professional friends of Dr Frampton to complete the work; and for this purpose the assistance of various gentlemen, all, with one exception, connected with the London Hospital, was obtained. In consequence of this arrangement, the second volume is the joint result of the labours of several writers, while both volumes have had the advantage of being carefully revised by competent and well-informed authors.

Dr Herbert Davies, well known for his work on the Physical Diagnosis of Diseases of the Lungs and Heart, revised the articles relating to Diseases of the Chest,—namely, Phthisis, Emphysema, Hydrothorax; and to correct the articles Anasarca, Jaundice, Headach, Toothach, Tic Douloureux, *Gastrodynia, Herpes, Tinea, Psora, Impetigo and Akne.*

Dr Parker, Assistant Physician to the London Hospital, wrote the article Insanity.

Mr Critchett, Senior Assistant Surgeon to the London Hospital, and known for his work on the Causes and Treatment of Ulcers of the Lower Extremity, prepared the articles on Ulcers, Scalds, and Burns, Suspended Animation, Anaesthesia from Chloroform and Ether, and Frost-Bite.

Mr Wordsworth, Assistant Surgeon to the London Hospital and to the Royal London Ophthalmic Hospital, prepared the articles on Hydrocele, Hydatids; Diseases of the Senses, Nyctalopia, Amaurosis, Deafness, Squinting; Enuresis, Spermatorrhœa, Ischuria, Dysuria, Cancer, Fungus

Haematodes, Guinea Worm, Elephantiasis, Lepra, Sprain, and Calculus.

Dr Henry Powell prepared and revised the Articles relating to diseases of Females; namely, Leucorrhœa, Amenorrhœa, Chloresis, and Menorrhagia, and diseases of the Pregnant and Puerperal States.

Lastly, the article Poisons, which had been left in an unfinished state by Dr Frampton, was completed by Letheby, Lecturer on Chemistry and Toxicology in the London Hospital Medical School.

It thus appears, that considerable pains have been taken, to give the work the character of being as complete and recent a system of medical knowledge, as its limits would admit.

The method of arrangement adopted by Dr Thomas has been in general retained; but very considerable changes have been introduced, and additions and modifications of different articles have been made, with the view of adapting the work to the demands of the present time.

It comes not within our purpose, to enter into any minute examination of a book like the present; but it may not be unseasonable shortly to notice some of its leading characters.

It may have been observed by any one who watches the signs of the times, that there is at present a strong tendency to ascribe the origin of continued fever,—that is, Typhus and Synochus, as defined by Cullen and various other nosologists, —as well as that of Intermittent Fever and Remittent Fever, to the miasmatic vapours and exhalations of filthy, wet, ill-drained localities and abodes. Against this notion the editor of the present work expresses a decided opinion, and he adheres to the old opinions, that Intermittent and Remittent Fevers arise from miasmatic poisons and vapours, and that Typhus and Synochus are the offspring of the bad air of crowded dwellings, where, in consequence of imperfect ventilation, the exhalations from the human body either become converted into a poison capable of producing fever, or its contagious cause is very powerfully favoured in its action and propagation, by famine and imperfect food, bad ventilation, and all those causes that contaminate the air.

The origin of Synochous and Typhous epidemics is certainly involved in considerable obscurity; for although it used to be the fact, that fevers of this character were mostly seen to arise and prevail in crowded, densely-peopled districts, with great disregard to cleanliness and ventilation, yet upon other occasions they have been seen to arise and prevail under circumstances, where it is not always easy to trace these conditions, in a greater degree at the time when fever is prevalent, than when it is not prevalent. Often fever prevails where it cannot be said that ventilation is deficient, but where cold and moisture are prevalent, and food is expensive, scanty, and not good.

The Registrar-General and his friends and adherents have been carrying, to as great an extent as possible, the hypothesis of foul and obstructed drains, filth of every kind and variety, as constant causes of Continued Fever. That these agencies may produce fever, perhaps, cannot be justly denied. But it seems most doubtful, whether they are causes under any circumstances of the disease known as Typhus and Synochus. We believe, as has always been believed by physicians for three or four centuries, that foul drains, marshy damp ground, undrained spongy soil, ditches, stagnant pits of water, may produce Remittent Continuous fever (*Amphimerina; Tritæophya*), which, in its course, and especially at its close, bears so close a resemblance to Typhus, that it cannot be distinguished from that disease. It has never appeared, however, to those accustomed to observe and reason upon these questions, that any evidence was afforded to shew, that these forms of fever were the same, or that they arose from the same source. There is reason, further, to believe, from the evidence of many undoubted facts, that both diseases prevail in London, namely, both remittent-continuous Fever, and synochus and typhus, and that this circumstance has led to the doctrine that Typhus fever arises from the exhalations of foul drains, ditches, wet marshy situations, and similar causes.

In speaking of Synochus, the editor considers that in all its forms it is contagious. He refers, especially, to the Edinburgh epidemic of 1843–44 as evidence of the truth of this doctrine. It is right that it should be known, that this epidemic did not appear to all observers to be contagious. It was evidently not so as fevers usually are. It arose at a particular season, spring, spread in a peculiar manner, yet did not present many of the characters of a contagious fever. It subsided of its own accord, and though it appeared since that time in 1847 and 1848, it cannot be said that it evinced decided characters of contagious propagation.

Dr Thomas had frequent occasion, during a residence in the West Indies of nine years, from the year 1776 to 1785, to observe Yellow Fever among seamen and such new visitors as were imprudent on their first arrival; that is, as is commonly understood, went about a great deal in the sun and at all hours, and indulged pretty freely in the use of intoxicating liquors. Although the disease never prevailed epidemically during the nine years specified, yet he looked on it as capable, under certain circumstances, of being communicated from one person to another. He had adopted the opinion, that a fever not contagious at its commencement, may acquire that character from confined air, filth, and accumulation; in short, the doctrine of contingent and acquired contagion. It is impossible to say what amount of mischief confined air, filth, and crowding may produce. But it appears to us, that it has not yet been proved, that they produce Yellow Fever, or render contagious a disease which is not naturally so, although we firmly believe that these adjuncts render the disease much more intense than it naturally is, and, consequently, more unmanageable.

Dr Thomas proposes the question, Why should it be denied that these circumstances may communicate a contagious character to *Typhus icterodes?* It is here to be observed, that this name, *Typhus icterodes*, applied by Sauvages and Cullen, two European nosologists, has been, and will probably long continue to be, one of the main causes why Yellow Fever has been believed by so many European physicians to originate in contagion, and to be propagated by contagion. It was denominated *Typhus*, because it presented at and towards its termination the phenomena of hæmorrhages, from various mucous surfaces, with great debility, and deadly sinking of the strength. Because it was denominated *Typhus*, it was presumed that, like Typhus, it ought to be a contagious disease; and hence, in opposition to historical evidence, and the testimony of the most impartial and unbiassed observers as to the rise and progress of various epidemics, it has been, and continues to be, by one party pronounced to be contagious, with a degree of confidence and obstinacy which is far from being pleasing in such a science as Medicine.

The present Editor gives a very just view of the question at issue, and allows that the doctrine of contingent contagion appears to him unsupported by any analogy, and to require for its establishment an amount of evidence, which has not yet been adduced.

The Editor then refers to the case of the Eclair at Bona Vista in 1845, and the arguments adduced by Dr M'William. Dr Frampton refers to the usual sources of information upon this point, but refrains from giving any decided opinion. This is the wisest course in circumstances of the kind; for, after all, all that any didactic writer, within moderate limits, can do is, to quote and balance authorities, and put the reader in a position to determine the question for himself. It may be mentioned, nevertheless, in relation to this matter of the Eclair, that it appears to us, that the facts adduced by

Dr King, in his Report, have hitherto neither been answered nor refuted.

The instructive observations by Dr Thomas himself, on the prophylactic rules and hygienic precautions to be observed by Europeans on arriving in the West Indies, are preserved. (Pp. 133–135.)

In the article on Plague there is a more decided inclination to maintain the essential and constant contagious character of that distemper, than modern observations and testimony would justify. This question has been so often of late years examined in this Journal, that it is quite unnecessary at present to recur to the subject. It may merely be remarked, that until the facts and arguments adduced by Bowring and Holroyd, Mr Laidlaw, and the Report of the French Commissioners be answered in a satisfactory and temperate manner, it will be impossible to look upon plague in any other light than that of a disease endemic in certain localities, at particular seasons, not annually to the same extent, but under a peculiar concurrence of atmospheric and meteorological peculiarities.

All those who have seen plague in Egypt, from Prosper Alpinus down to Clot Bey, allow that it never commences before a certain period of the year; that it ceases not to prevail till a particular period of the year; and that this commencement and cessation are entirely unconnected with contagion. It arises along the provinces and towns near the mouth of the Danube, so far as can be discovered spontaneously; and it ceases at its own times in these places. Though its appearance at Smyrna and Constantinople has been often ascribed to the maritime intercourse between the Egyptian ports and these places, the same argument cannot be applied to Aleppo and Erzeroum, both of which are inland cities, yet in both of which plague prevails in certain seasons to a great and destructive extent.

The descriptions of the order of inflammatory diseases is done with great skill and judgment.

In the account of Delirium Tremens a strong caution or rather a prohibition as to the use of chloroform for producing sleep is given.

A good account of Endocarditis and its effects, as well as the treatment most likely to be advantageous, is given.

The description of Albuminuria or Granular disease of the Kidney, or Bright's disease, is given in a most ample, correct, and instructive manner, and may be recommended as to semeiography, pathology and treatment, as containing all that is requisite for the practitioner to know.

The history of another most dangerous disease, Inflammation of the Veins *(Phlebitis)*, is given with great skill, and we believe is introduced in this edition for the first time.

In the account of the Treatment of Rheumatism, both by the author and the late editor, a great degree of sound sense and judgment is shewn in speaking of the employment of the multiplied remedies which have been for a considerable time in use in the treatment of the several forms of this disease. It seems to be altogether forgotten, that Acute Rheumatism is, in the great majority of cases, treated with great facility and certainty, by the moderate use of the antiphlogistic regimen. The editor observes, that he has seen not a few patients under the care of other physicians and himself recover from severe attacks of rheumatic fever under such simple treatment as confinement to bed, diet of farinaceous gruels and liquids; and the ordinary dose of saline mixture *(liquor ammoniæ acetatis)* taken three times daily, with an occasional aperient; and some mild narcotic,—as five grains of Dover's powder, if the nights were restless. The *liquor ammoniæ acetatis*, or Spirit of Mindererus, is an excellent diaphoretic, and answers well in rheumatic attacks. We understand, however, that the name of saline mixture was given not to this, but to the Citrate of Ammonia, and occasionally to the Citrate of Potass. Another similar method which we have found of singular use was to give first a dose of calomel and rhubarb, or calomel and antimonial powder, so as to act on the bowels; then to give the antimonial solution or antimonial wine during the day; and at the hour of rest twenty or twenty-five minims of laudanum, or one Thebaic pill. Under this treatment, with an occasional aperient in the morning, a large proportion of rheumatic cases get speedily well.

The author equally disapproves of the opiate method of Dr Corrigan, the mercurial plan of St George's and St Bartholomew's Hospital, the routine and indiscriminate bloodlettings of M. Bouillaud, and the large doses of nitre given by M. Gendrin. The great objection against these methods is, that all are too exclusive. It seems absurd, if not irrational, to trust the treatment of any disease to one single remedy or method, excluding all others, when it is known that the disease consists not in the derangement of one single function, but is the effect of the disturbance of several. The great objection to the opiate treatment, as conducted by its partisans, is that it is merely the treatment of one set of symptoms, namely, the pain; that it places a mask over both this and other symptoms; weakens the action of the stomach, and appears sometimes to favour the approach of disease of the heart and other internal organs. It is further ascertained, that recoveries after the use of opium, are much more frequently imperfect and partial, than after the use of those remedies which act generally on the disease.

Nitre, on the other hand, is a good and serviceable remedy, not, as has been thought, because it restores saline matter to the blood, but merely because it acts as an antiphlogistic, and probably keeps the blood in a greater degree of liquidity, than is compatible with the formation and separation of fibrine. The present Editor is desirous to form his judgment upon its utility, not upon these grounds, but upon the entire results of the treatment. In these results he sees nothing to recommend, or even to justify, the employment of treatment so elaborate, and expresses the opinion, that the influence which the doctrines of Hahnemann are exercising upon the profession, will lead medical practitioners to make trial, how far gentle means may suffice for the removal of this disease.—(P. 440.)

It is impossible to look upon this remark in any other light than one extremely unfortunate, if not imprudent; and we sincerely wish, that the remark had not been made. It is unnecessary here to say what we think, not merely of the doctrines of Hahnemann, for that is but one part of the question, but of the mode in which he and his adherents reason, act, write, and conduct themselves, in the application of their doctrines. But it must be manifest to every calm and dispassionate observer, that it by no means follows from the circumstance, that the members of the profession pass suddenly and rapidly from one method of treatment, and the exclusive use of one remedy to another, and give the most contradictory results, that it is necessary to throw themselves upon the doctrines of a person, who never had a clear or distinct idea of the nature of disease, and certainly no correct ideas upon the mode or modes in which disease subsides and is cured. The proper course in such circumstances would be, to recommend treatment more simple, methods less exclusive, and the employment of fewer remedies. Going to one extreme, though often followed by going to another, by no means justifies such a proceeding. We have often of late years said, that the great evil of modern therapeutics is the great multiplication of medicines and remedies, the constant fondness for some new method, the entire want of judgment and discrimination in the selection of therapeutic methods and remedies, and the consequent indecision and fluctuation in the principles and practice, both of teachers, writers, and practitioners. What is wanted at present amidst the wealth with which Therapeutics and Materia Medica are oppressed and encumbered, are selection and appropriation, simplicity, adaptation, and efficiency. For a long time there has been a considerable abuse, as it may be called, in this department of Medicine. Is it not possible to obtain the use without the abuse? Are physicians never to exercise judgment, but to act like machines, without thought, and without the exercise of reason?

The Editor is opposed to the use of conium, digitalis, and aconite, upon the internal use of the last of which he pronounces a strong condemnation, because the tincture proved the means of hurrying out of existence the late Dr Male of Birmingham. There is no doubt that the tincture of aconite is a powerful and therefore dangerous medicine; and, if left in the hands of careless, or, as in the case of the Convent of the Good Shepherd, ignorant dispensers, may often produce fatal consequences. But surely this is not a legitimate argument against its regulated use in cases in which the medicine may be indicated. We acknowledge, on the other hand, that there are plenty of less dangerous remedies to treat rheumatism; and that where these fail, it is not likely that aconite is to succeed. The account of the treatment of chronic rheumatism is given with ability.

It would lead, however, to diffuseness and prolixity were we to notice all the good matter in these volumes. The description of the Pathology and Treatment of the second large Class of Diseases, the NEUROSES, or Disorders of the Nervous system, forms an instructive and interesting part of the Treatise. In these, and indeed in all the Divisions of the work, both Dr Frampton and his coadjutant successors have done all that could be expected in order to place before the reader the best and the most recent information on the pathological nature of diseases, and the means to be employed for their removal and alleviation. Examples of this will be found in the articles on Apoplexy, Cholera, and Diabetes.

In conclusion, we feel it our duty to say, that the present edition of the Modern Practice of Physic is a work, in which the practitioner will find correct views on the nature of diseases, and the most approved if not the most recent methods of treatment, with a considerable proportion of cautious advice to guide him in the formation of his practical judgment. The standard of the work is decidedly elevated.

We may subsequently take opportunity to notice some of the subjects treated in the second volume.

ART. V.—1. *On Femoral Rupture; its Anatomy, Pathology, and Surgery. With a new mode of operating, applicable to cases of Strangulated Hernia. With Plates.* By JOHN GAY, Fellow of the Royal College of Surgeons of England, Surgeon to the Royal Free Hospital, Fellow of the Royal Medico-Chirurgical Society, Surgeon to the Provident Clerks' Assurance Office, &c., &c. London, 1848. 4to. Pp. 97. Three Lithograph Engravings.

2. *On the Operation for Strangulated Hernia.* By HENRY HANCOCK, F.R.C.S.E., President of the Medical Society of London; Surgeon to and Lecturer at Charing Cross Hospital; and Lecturer on the Anatomy and Diseases of the Eye, Royal Westminster Ophthalmic Hospital. London, 1850. 8vo. Pp. 94.

These two works upon Hernia, though containing much valuable information, are principally devoted to the discussion and the determination of one question of practical importance,—namely, that of opening or not opening the sac in the operation for relieving a strangulated portion of bowel.

The work of Mr Gay is particularly entitled to notice, as giving a correct anatomy of the parts concerned in Femoral Hernia, with a very learned examination of the principles of the operation, and their application to what Mr Gay deems the best mode of operating for the safe and effectual removal of the stricture.

A large proportion of the treatise of Mr Gay,—about thirty-six pages,—is occupied in explaining the anatomical relations of the parts concerned in femoral hernia, and elucidating the anatomical and mechanical causes of the formation of hernia. The anatomical descriptions have been deduced from careful examination of the parts in above seventy subjects, and they bear every mark of having been faithfully prepared. To examine this part of the performance is unnecessary, because it would be quite useless to make such an examination in these pages; but this part of the work may be strongly recommended to those who are studying the anatomy of hernia in the dissecting-room, as a useful guide in giving a clear view of the parts concerned.

Mr Gay then proceeds to give the Pathology of Femoral Hernia, that is, the mode in which the bowel is protruded, the sac is formed, and how all the textures become altered by pressure, by displacement and inflammation. At paragragh 26 page 46 he shews how Femoral Rupture is effected, and enumerates the parts by which, singly or jointly, Strangulation may be produced. These are;—

1. The *band of Fibres* pertaining to the membranous walls of the sheath, which occasionally becomes concerned in constricting a hernia tumour at the ring.
2. The Crural Ring.
3. The *Femoral Ligament* or Hey's Ligament, and Gimbernat's Ligament, which surround and constrict the front and pubic side of the ring.

These are the most constant seats of stricture external to the neck of the sac.

4. The *margins of the lower orifice of the Crural canal*, when unusually dense will not only present a defined sharp edge to the finger, but especially resist any attempts to stretch them; and may, therefore, under such circumstances, assist in the strangulation of a hernial tumour.
5. The *edge* of the *falciform process* of the *fascia lata.*
6. The *Septum Crurale.*
7. The Cribriform Fascia.

Mr Gay next takes a view of the method of treating strangulated hernia at different periods of the history of Surgery; and at length arrives at the period, when the mode of operating without opening the sac began to be viewed with favour, and certainly was strongly recommended to the profession by the authority of the late Mr Aston Key. Mr Key had made his first attempts in 1829 to operate in this manner, which was originally the method advocated by M. Petit; and his reasons for it were made known in a lecture in the Medical Gazette for 18th July 1829. It was not, however, till four years subsequent to this period, that is, in 1833, that Mr Key published his Memoir on the External Division of the Stricture in Strangulated Hernia. This publication, it may be remembered, was examined at some length in the Forty-first Volume of this Journal (p. 212); and while a full account was given of the reasons upon which Mr Key was led to recommend this mode of operation, after it had fallen in a great degree into disuse, we stated, at the same time, certain circumstances which, it appeared to us, explained the mortality complained of by Mr Key, by ascribing it to different causes, and also those objections which, it was probable, would weigh with surgeons in making them rather adhere to the method of operation by opening the sac.

It is quite unnecessary, therefore, at the present time to resume the consideration of the question, or to enter into any discussion upon the comparative merits of opening or not opening the sac in all cases of operation for strangulated hernia. It is pretty clear that the method of M. Petit had been generally abandoned on grounds which appeared satisfactory; and it is not less clear, that the method of operating by laying open the sac, had been adopted by many eminent surgeons upon grounds that to them appeared satisfactory.

Mr Gay,—who has evidently studied this subject with great attention,—appears as a strenuous, and, on the whole, an able advocate for the operation of Petit, as revived by Mr Key. Mr Gay has also taken the only means by which a just estimate can be formed of the comparative merits of different operative methods, namely, by referring to the statistical results of large numbers of well-recorded cases. Of 80 reported cases, collected by Mr T. W. King from the practice of Arnaud, Pott, Key, Sir A. Cooper, Scarpa, Lawrence, Key, and others, in which the operation had been performed in the usual manner by laying open the sac, 34 cases were unsuccessful. Among nine cases operated upon at the Edinburgh Infirmary, in this way, between the years 1839 and 1843, four died. From reports by Mr Howship, among nineteen persons operated upon by laying open the sac, eleven died. Mr Inman of Liverpool collected, in 1845, from many different sources in England, Scotland, and foreign countries, the number of five hundred and forty-five (545) cases; all of which, it is presumed, were operated on in the usual mode; and of these two hundred and sixty (260) died.[1] In the practice of Mr South, while assistant-surgeon at St Thomas's Hospital, among sixteen cases, six terminated unfavourably. From the Report of the Cases admitted into Guy's Hospital, from September 1841 to December 1842, among nineteen operations, nine persons recovered and ten died. In the hands of Mr Luke, again, the operation was attended with an unusual degree of success; since, among eighty-six cases, operated on between 1831 and 1841, only nineteen persons died. It follows, from the numbers given, says Mr Gay, that, among 774 persons operated upon, 334 have died. We give Mr Gay's own statement; but we add, that we think he has counted twice the Paris cases and the Wurtzburg cases, because they are given in the list of Mr Inman. We know not that this makes much difference. The cases collected by Mr Inman give a mortality of nearly one in two, or about one half of the cases operated on.

Mr Gay thinks that since the principle of the operation of Petit has been revived, the rate of mortality has undergone

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[1] Edinburgh Medical and Surgical Journal, volume sixty-third, p. 513.

a sensible diminution. To shew the contrast more distinctly, the author gives the following tabular view of cases treated according to the two different methods.

Whence obtained.	Total number of Cases.	Sac Opened.	Deaths.	Recoveries.	Sac not Opened.	Deaths.	Recoveries.
Miscellaneous, . .	57	48	25	23	9	2	7
Mr Howship, . . .	8	6	3	3	2	2	—
Mr Poland's Report of Guy's Hospital,	17	12	7	5	5	2	3
Mr Luke, ...	82	25	8	17	57	7	50
St George's Hospital, 1842-1843, . .	34	34	9	25	—	—	—
Total . . .	198	125	52	73	73	13	60

It thus appears that among 198 cases the operation was performed by opening the sac in 125 cases, and by not opening it in 73 cases. Among the 125 in which the sac was opened, 52 persons died, and 73 recovered. Among the 73 cases in which the sac was not opened, 13 persons died, and 60 recovered. The mortality is nearly two-fifths in the former cases; in the latter it is a little more than one-sixth.

Mr Gay next takes a survey of fifty-two fatal cases, in order to remark the pathological changes which had taken place. He finds on examining the histories of these cases, that there is no evidence to shew that peritonitis existed previous to the operation; nor, in any case did the inflammatory action, when it existed, which was only in eight instances, appear to have been so considerable as to account satisfactorily for the results. In 23 cases in which peritonitis existed, but in which the fatal result did not speedily follow the infliction of the injury, the traces of this affection were evident in portions of the abdominal viscera, which had not been involved; while the portion of bowel, which had been strangulated, shewed still more important changes,—from a condition of capillary hyperæmia, to gangrenous or other perforation of its walls. In most of these cases the operation was deferred to a period of from three to eleven days.

There were other cases, however, in which the intestine was found divided or ruptured, though the symptoms of strangulation had continued only for twenty-four hours. . . . .

In five of these fifty-two cases an effort was made to liberate the strangulated intestine; but it was not successful; the parts having been returned into the abdominal cavity still incarcerated.

From his observations on the whole number of cases, Mr Gay deduces two conclusions.

The first is, that strangulation of a portion of intestine can produce death, either by mechanical injury to the constricted viscera, or by the sudden depression of the vital powers, which is apt to follow so violent a shock. The probability of the latter result is proportionate to the systemic inertia, and the degree to which it might have been influenced by such agencies as age, disease, and similar circumstances.

The second conclusion is, that, in case strangulation is not suddenly fatal in the manner now referred to, it may terminate life by inducing a series of morbid changes in the constricted parts.

These results, again, depend upon, 1*st*, the tightness of the stricture; 2*d*, the length of time during which constriction is continued, with other causes to be subsequently noticed; and, 3*d*, the co-existence of organic lesions in important organs.

Delay, procrastination, has been by all surgeons observed, and pronounced to be the main cause of fatality in the instance of operations for strangulated hernia. This delay is produced in several modes; but two are so frequently observed, that they should be remarked; and one at least, against which, to a certain degree, precautions may be taken, as something in the power of practitioners, deserves attention. A person is taken ill with symptoms of sickness, vomiting, pain in the abdomen and groin, and obstinate constipation. The friends and neighbours think this to be iliac passion, or it may be, only simple constipation, and recommend all the usual remedies employed and believed to be serviceable on such occasions. None are found to avail in stopping the vomiting, which at length becomes stercoraceous; and a medical man, if not before, is now summoned, and recognises rupture in a state of protrusion and strangulation. He recommends the operation, of course; but the bowel has been down six, seven, or even ten days; for this length of time it was in two of the cases referred to by Mr Gay; great disorganisation has been produced, and it is not wonderful that the operation is not successful. The reasons why, will be understood by any one who peruses what was said on this subject, when we were considering the method recommended by Mr Aston Key in volume forty-first.

In these instances, the cause of delay is mostly to be ascribed to the ignorance and prejudices of the patient and his friends.

In the second place, a person is attacked with the usual symptoms of intestinal obstruction; sickness, vomiting, abdominal pain and constipation; and these symptoms are forthwith traced to a protrusion of the bowel and strangulation. But the patient is averse to operation; and the surgeon, probably thinking that the Taxis and other means have not been sufficiently tried, puts all in active employment. The patient loses blood, is placed in the warm bath; ice is applied upon the tumour; enemata are administered, and tobacco especially is tried. During all this time the bowel is still in a state of strangulation, and evinces no disposition to retire within the abdomen. In this manner is lost valuable time, which would be much more profitably spent in at once performing the operation. Now, however, the chances of the patient are greatly diminished; and when the operation is at length performed, it is not wonderful, that in no long time the patient afterwards breathes his last.

Mr Gay adduces three tables to shew the pernicious effects of this system of delay and procrastination, whatever be its cause. They all distinctly prove that the mortality is greater, as the period during which the bowel has been allowed to remain strangulated, is prolonged. In one column of the fourth table are seen 41 cases operated upon, in which the period between strangulation and operation was two days. Of these forty-one cases thirty recovered and eleven died.

Mr Gay gives also a table shewing the effects of Taxis, and various other means employed, before having recourse to operation. All are, with the exception of bloodletting, more or less hurtful. The tobacco enema, in the dose of one drachm, in which it is often administered, is a most dangerous agent.

The operation itself as usually practised, says Mr Gay, that is, by opening the sac, is itself another, and probably, not an unfrequent cause of death. This leads to the remedy, the recommendation of which is the great purpose of the work of Mr Gay. The operation should be performed without opening the sac, if possible; and if this be requisite, it should be done to as small an extent as possible, in order to avoid and obviate the occurrence of peritonitis.

The following directions are given by the author:—

"For the first step of the operation, two imaginary lines should be drawn *from the point directly over the* inner side of the neck of the hernial tumour; one to the tuberosity of the pubis; the other down the thigh along the inner side of the tumour. These two supposed lines will include an angular space, in which, and about mid-distance from either, the *first incision* is to be made. This incision should commence just within the angle formed by the meeting of these lines, and be carried inwards and rather downwards, for the extent of an inch or little more; and should divide the integuments and superficial fascia over the *femoral fossa.*

"For the second part of the operation, the fore finger of the left hand (if the hernial tumour is on the right thigh, and *vice versa*) is to be passed through this wound, upwards and outwards, along and close to the side of the hernial tumour, to its neck. Should any of the deep laminæ of the superficial fascia which occupy the femoral fossa obstruct its passage, these must be divided.

"The blunt point of a bistoury caché, guided by the tip of the finger still on the wound, is to be passed *through* the cribriform fascia (one of the sheath-like apertures in which it will readily enter), and the delicate *vaginal sheath* which alone intervenes between it and the crural canal. It is now to be directed upward, through the *canal*, to the *ring*, where it usually meets with resistance from the seat of stricture. By the least amount of force, and with the aid of a little gentle compression of the inner side of the tumour by the finger, the point of the bistoury may be insinuated between the *sac* and the pubic margin of the *ring*. The edge of the knife is then to be turned towards the pubes, and, by projecting the blade, the seat of stricture in that direction may be effectively divided. Should the surgeon, however, be disposed to direct his incision forwards, it may be done either before or after the incision of Gimbernat's ligament with equal facility. It will be obvious, from a reference to the anatomical relations of the parts, that in its course from the femoral fossa through the cribriform fascia, crural canal, and ring, the knife will pass successively behind the falciform process, the edge of the lower orifice of the canal, Hey's ligament, and the fibres of the inguinal ligament of Hesselbach; and thus be made to command whichever may happen to be the particular seat of stricture. By taking care not to keep the knife too close to the side of the hernial tumour, after its point has passed the cribriform fascia, its point would glide between the sheath and the deep layer of the iliac fascia lata; and in this way it would pass *between* the *ring* and the *last portion of Hey's* and *Gimbernat's ligaments*, and thus a division of these structures might be effected from the *outside* of the sheath or canal.

"If, after the division of the ring and parts on its pubic and front sides, the hernial tumour is not to be replaced without the employment of force, the stricture cannot have been dilated; and the surgeon would then have to contemplate the possibility of its being situated in the fibres of the septum crurale. The still constricted neck of the sac would in that case be felt, and it would be for the surgeon to get his knife cautiously behind the constricting fibres. This could be most easily done by such a knife as that I am in the habit of using,—which has a beak flattened in the direction transverse to the edge,—by gently pressing the side of the tumour outwards immediately below the seat of constriction, so as to gain room for its introduction.

"Should the seat of stricture be in the margins of one of the apertures of the cribriform fascia, which would in all probability be discovered at an early period of the operation, the means for dilating it would be analogous to those which have just been detailed.

"If, after the division of these various textures external to the sac, the hernial tumour should still remain constricted, the external wound would have to be enlarged, and the seat of stricture looked for either in the neck of the sac, or within the sac and amongst its contents."

Nine cases of different sorts of strangulated hernia are given, to illustrate the safety of this mode of operating.

Mr Hancock allows, that the prominent manner in which the old operation of Petit has been brought before the profession by Mr Gay, has been with him a considerable inducement to submit to the profession the remarks contained in his volume, not, he allows, as presenting novelty, but rather with the view of eliciting opinion as to the most eligible mode of operation, and the treatment that seems most deserving of adoption in cases of strangulated hernia.

Mr Hancock has taken a careful view of the reasons for and against the two modes of operation; and, though he is evidently disposed in favour of the modern method by opening the sac, he allows the facts to speak very much for themselves. Mr Hancock admits, like most surgeons, the large mortality; but he ascribes it not to the circumstance of opening the sac, but to various other causes.

"We have here the account of 126 cases, in eighty-six of which the sac was opened. After deducting the fifteen which must have proved fatal, whatever operation had been performed, seventy-one fair average cases in which the sac was opened remain. Of these eight terminated fatally, or one in nine, whilst, on the other hand, of the forty in which the sac was not opened, after deducting one in which the aorta was ossified, we have thirty-nine, of which five terminated unsuccessfully, or one in seven and a half.

"Through the kindness of Mr Hamilton and Mr Puleston, I have been enabled to obtain the particulars of 548 cases of strangulated hernia, collected from various sources. Of these the sac was opened in 474, the operation proving successful in 307, unsuccessful in 167. In three the gut was injured in dividing adhesions; sixty-one proved fatal without any complications, and of the remaining 103, in thirty-three the gut was gangrenous; in thirteen it was gangrenous, and had burst; in thirteen the gut was perforated by ulceration; in one the patient had burst the intestine in his endeavours to return it before the operation; in six, the intestine was adherent to the internal ring; in seven, adherent to the sac; in eight, gangrenous omentum;

in seven, adventitious bands and adhesions together; in two, double sacs; in two, sacs contained pus; in one, colon was twisted, and could not be returned; in one, Petit's operation was first tried and failed; in one, patient delirious, *in articulo mortis;* in one, sloughing placenta found in the uterus after death; in one, disease of the brain; in one, ossification of the aorta; in one, encysted hernia of tunica vaginalis, unrelieved; in one, pneumonia, after twenty-three days; in one, constricted intestine at point of stricture, the rectum severely ulcerated from very hot enemata; in one, patient had been operated upon three times, and in another, the patient had taken several doses of croton oil, turpentine, &c., before the operation; immediately the gut was liberated, the bowels began to act, and continued to do so, almost without intermission, until she died, twelve hours after.

"It should be stated that the condition of parts here given was in almost every instance found at the time of operation, and not merely observed after death; it must therefore be admitted, that the above 108 cases would have terminated fatally had Petit's operation been performed, consequently the number should be calculated at 307 successful, sixty-four unsuccessful, or one in six.

"On the other hand, the sac was not opened in seventy-four. In five it failed, under circumstances which would equally have influenced any operation. I therefore leave those out, and take unsuccessful cases, in one of which the gut was wounded, at seventeen, leaving fifty-two successful cases, or one in four."

The mortality in cases of operation for strangulated hernia Mr Hancock ascribes partly to age, the most favourable period being below twenty years, and the most unfavourable being between sixty and ninety years; and partly to delay caused by the use of the taxis and other remedies. As we have already anticipated this part of the subject, we must be satisfied by referring readers in general to the work of Mr Hancock.

In ordinary circumstances, the bowels, when relieved from strangulation, begin to act of themselves; and if not, the most gentle laxatives are sufficient. Mr Hancock gives a strong and decided opinion against the incautious use of purgatives, because they are liable to excite or reproduce inflammation. On this point some useful information is given at pages 73, 74, and 75.

Lastly, Mr Hancock deduces from his inquiry, and the facts which he has collected, general and statistical, the following conclusions:—

"A close examination of the statistics and arguments in favour of not opening the sac in the operation for hernia, tends greatly to diminish its claims to superiority over the more usual proceeding.

"That, opening the sac does not increase the danger of the operation, but on the contrary, is to be preferred as the safer mode of proceeding.

"The majority of fatal cases are not consequent upon the exposure of the inflamed or strangulated portion of bowel, caused by opening the sac, as is stated by Key.

"Comparatively few cases die of simple peritonitis after the ordinary operation.

"The amount of mortality is not in the same ratio as the extent of the peritoneum and intestine exposed.

"Incisions made into peritoneum, with a view to relieve an inflamed condition of that membrane, are calculated to diminish, not augment, the inflammation.

"We may incise diseased with greater impunity than healthy peritoneum.

"Rapid depression of the vital powers with death, are not to be attributed to opening the sac. Similar cases are frequently seen, where operations are performed not implicating a serous membrane or a portion of bowel. They are to be met with, likewise *after* division of the stricture external to the sac.

"The plan of scarifying the neck of the sac, is extremely hazardous.

"The risk of wounding the intestine is less in the usual, than in Petit's operation.

"The stricture should be divided before any attempts are made to draw the gut from under it; but after the division of the stricture, the gut should always be gently drawn down, and the constricted portion carefully examined before it is returned into the cavity of the abdomen.

"Bleeding into the abdomen from wounded artery during the ordinary operation, is not necessarily fatal.

"The cases of Lawrence, Breschet, Lallemand, and others, prove that the fear of bleeding in these operations, is much exaggerated.

"Petit's operation not being applicable to all cases, exposes the patient to the danger attending error of selection.

"The sac should be opened, that we may thereby be enabled to judge of the condition of the intestine,—whether healthy, ulcerated, or gangrenous; whether adhesions confine it to any part of the sac; the condition and disposition of the omentum, the number of protrusions, the condition and arrangement of the sac, whether double, single, or otherwise, and the seat of stricture.

"Unless the sac be opened, we are unable to pass a finger into the ring after the reduction of the gut, to ascertain whether adhesions exist in that situation, and which, unattended to, might nullify the success of the operation.

"In Petit's operation, mischief may accrue from returning fœtid and decomposed fluid contained in the sac, into the cavity of the abdomen.

" On cutting through the superficial coverings of a hernia, their peculiar odour and appearance do not warrant the conclusion, that the gut is in a gangrenous state.

" On the other hand, these signs may be absent, and yet the intestine be found mortified.

" After performance of Petit's operation, we may have occasion from the persistence of symptoms of strangulation to open the sac, and thus two operations are performed ; whereas, most frequently, one alone is necessary when accomplished by the usual method.

" The practice of exhibiting purgative medicines before operating for strangulated hernia, with a view to the liberation of the gut by its own movement, is improper.

" The operation has the best chance of a successful issue when undertaken early. The long continued employment of the taxis, diminishes that chance materially.

" The successful cases treated by Petit's operation would have been equally successful under the usual treatment; a very large number of those in which it failed might have been saved, had the sac been opened and the ordinary operation performed.

" If, when the patient is well under the influence of chloroform, the gut will not readily return into the abdomen, we may reasonably infer, that the existing constriction is too great to be overcome by ordinary means, and we ought at once to proceed to the operation.

" The employment of chloroform should supersede the necessity of warm bath, bleeding and tobacco, in the treatment of strangulated hernia.

" The injurious effects of purgative medicines after the operation for strangulated hernia, are shewn by the increased urgency of the symptoms, and the fatal results attendant upon their exhibition.

" Mild enemata are preferable, after the operation, to medicines given by the mouth; but these should only be employed after all symptoms of inflammation have subsided.

" A dose of laudanum should be given immediately after the operation, and repeated as often as occasion may require."

It thus results, that the question of laying open the sac in the operation for strangulated hernia, remains as much as ever a subject open to inquiry. It appears further, that, if rules can be at all laid down upon this point, the most eligible course is to open the sac. In point of fact, no surgeon can tell, before he begins to operate in any given case, whether it may be requisite to lay open the sac or not. In the majority of cases we believe it will be found impossible to avoid laying it open. Under all circumstances, the surgeon could not be sure of having relieved at all points the strangulated bowel unless the sac is laid open to such extent as to allow him to see its state, and to feel by the finger the points at which constriction is most considerable.

PART III.

MEDICAL INTELLIGENCE.

I. THERAPEUTICS.

On the application of Gutta Percha in the Treatment of Diseases of the Skin. By Robert J. Graves, M.D., F.R.S. **Dublin Quarterly Journal of Medical Science, August 1, 1852. Vol. xiv., p. 1.**

Dr Graves directs the attention of practitioners, in the treatment of certain forms of cutaneous disorder, to the necessity of protecting the abraded and tender surface of the skin, the *cutis vera*, from the contact and action of the air and other hurtful agents. The effect of blood coagulating over a cut or abraded surface is known to be beneficial, and not less serviceable are those secretions which are furnished by surfaces abraded and in a state of inflammation. The premature and forcible removal of all these discharges, which are to be regarded as natural coverings, is always injurious, and tends to continue inflammation and irritation, and consequently to defer healing and protract the disease.

Dr Graves thinks that artificial substitutes for these secreted coverings, or artificial coverings over them, may be useful in effecting the healing of extensively abraded surfaces in cutaneous disorders. Of this nature are solutions of collodion, which have been in occasional use for some time; and more recently solutions of gutta percha in chloroform have been employed with similar beneficial results.

It is well known that there are certain obstinate forms of cutaneous disorder, in which, whether from the nature of the disorder, or the extent of skin abraded, denuded, and irritated, it is often difficult to effect either cure or alleviation. Such are some forms of psoriasis, eczema, impetigo, and leprosy. In treating affections of this kind, a covering of gutta percha seemed to Dr Graves well calculated to protect the tender surface, and thereby to promote the healing process. After various trials with this agent, the results have been such, that Dr Graves conceives that they ought to be well known. The therapeutic application of gutta percha is mentioned by Dr Neligan in his recent work. But it may be useful here to give some notice of the method from the account by Dr Graves himself.

When the saturated solution of gutta percha in chloroform is spread by means of a camel's hair pencil over a portion of the skin, the solvent fluid rapidly evaporates, leaving a delicate and extremely thin pellicle of gutta percha firmly adhering to the part. The peculiar toughness of gutta percha prevents this pellicle from being brittle, and therefore it is much less liable than collodion to crack and fall off in small scales. On the forehead or face, where it is not affected by friction of the clothes, it remains firmly attached for five or six days, or even longer; but on other portions of the surface it is often rubbed off much sooner. Over dry eruptions of the skin it lasts longer than over those which are moist, and over smooth and firm spots, of course, longer than over those covered with rough morbid scales or loosely adhering crusts. Before the application of this solution, therefore, the practitioner will do well to render the portions of the cutaneous disease to which he intends to apply it, as free as possible from crusts or scales, by means of poultices, alkaline lotions, &c. When this precaution is taken, he will find that the artificial cuticle which he has applied with his brush will in certain cases act most sensibly on the subjacent disease, diminishing inflammation and its consequences, and powerfully contributing to the restoration of the healthy structure of the skin.

Whether it acts by the equable pressure which the film of gutta percha, suddenly coagulated from the fluid state, must exert on the surface to which it becomes so firmly adherent, or whether its efficacy be rather owing to other causes, it is beside the object of Dr Graves in writing this notice to discuss. He remarks, however, that the curative properties of such an artificial covering are not confined to the skin; for, in the "Gazette Médicale de Paris" (April 10, 1852), is an account of the successful application, by M. Dechange, of collodion in orchitis; and the *modus operandi* is said by him to consist in its compressing the tissues, and protecting the parts from the action of the air, which he thinks is a powerful element of phlegmasia. Without giving an unqualified assent to this explanation, Dr Graves has no hesitation in announcing his firm conviction, that, in diseases of the skin, this solution furnishes us with a new and active remedy, exerting effects quite different from those produced by any topical application hitherto in use.

The transparency of this artificial membrane enables the surgeon to watch the progress of the subjacent diseased skin, and its colourless nature prevents it from disfiguring the face when the eruption occupies that part. Its perfect cleanliness, too, is no small advantage, and affords a very agreeable contrast when compared with the usual ointments, &c.

The observations of Dr Graves confirm what reasoning on this subject would lead us to expect, that this application is more suited for dry, scaly, tubercular, and chronic diseases of the skin than for acute affections attended with much oozing of fluid and comparatively active inflammation.

Still, its good effects are by no means limited to chronic diseases of the skin, or to those of a scaly, dry nature; for, as will hereafter appear, Dr Graves has seen it decidedly useful in the spreading form of impetigo. His experience of this remedy makes him anxious to witness its application in the first stages of erysipelas, as analogy leads him to hope for good results in such cases.

Of course the patient must aid the efforts of the physician, and must, as far as possible, abstain from every thing which tends to rub off or injure the artificial cuticle; for its virtue ceases when its continuity is broken and the external air finds admission to any part of the diseased surface.

Early in the month of November 1851, Dr Graves was called to visit Mrs C., from ———. She was about fifty years old, full and plethoric; the mother of a large family, and, until the disease of which she then complained, commenced, generally healthy. About two years before, she observed small spots of impetigo on her limbs and body, which succeeded each other, some healing while fresh ones appeared. During summer she was nearly free from them, but last autumn they returned with greater virulence than ever, and have since increased both in size and numbers, some being larger than the hand, and attended with constant oozing of fluid, which imperfectly coagulates, forming loose and thin crusts. The itching at night was intolerable, and nearly deprived her altogether of sleep. Dr Graves employed the usual general and topical treatment for a fortnight without alleviation of her sufferings, when he thought of trying the saturated solution of gutta percha in chloroform, and had it carefully applied by Mr Nicholls of Dawson Street, at first by way of trial, to one of the smaller spots, and on the following days to each of the larger patches of eruption in succession. The relief obtained was such that it appeared almost incredible, both to the patient and her family. Her cure was accomplished in less than three weeks; for, dreading the sudden stopping of so great a discharge and so much cutaneous irritation, he proceeded cautiously, and towards the end of the cure, when she returned home, he directed an issue to be inserted in her arm, as a measure of precaution. She has continued well up to the present time (11th April 1852).

In this patient the attendants were at first obliged to re-apply the gutta percha every second day, as it was rapidly detached and broken up into large flakes by the discharge from the subjacent surface. Its healing influence, however, speedily diminished the diseased secretion, and then, the artificial cuticle remained longer adherent, and it was not necessary so often to use the scissors for the purpose of cutting off the loose portions of gutta percha membrane previously to applying a fresh layer. The camel's hair brush should be plunged, the moment it has been used, into hot water, to prevent it from being consolidated by the coagulated gutta percha.

This case caused a great sensation among the patient's friends and relatives, and many were the inquiries made relative to the method of cure employed. Dr Graves confesses that his own astonishment at the result was not less than theirs.

Since that time Dr Graves has repeatedly used this application in *acne of the face*, in which disease each of the pimples should be covered with the solution, and the patient enjoined not to rub off the pellicle by washing, &c.

In some this treatment alone causes a material and rapid diminution of this tormenting eruption, and by perseverance in this plan, there is every appearance in two of his patients that the tendency to throw out the pimples is gradually ceasing.

Finally, in several cases of psoriasis Dr Graves applied this solution with great benefit. In this disease much care must be taken to prevent the application being rubbed off by the clothes, and no woollen stockings or rough garment of any sort should be allowed next the skin. I had the satisfaction of curing in a fortnight a chronic psoriasis of the back of the hands and arms in a lady who had been under homœopathic treatment for six months without deriving the least advantage from the infinitesimal doses prescribed by the practitioner.

Since the preceding observations were written, Dr Graves received the following note from Mr Moore. This additional information concerning the effects produced by the application of collodion strongly verifies the observations respecting the local antiphlogistic action of a gutta percha pellicle:

"M. La Tour has for some time advocated the doctrine that external inflammation may be speedily subdued by withdrawing the affected surface from the influence of the air. This he effects simply by a layer of collodion, which, he says, rapidly assuages the inflammation of gout and articular rheumatism. At the meeting of the Academy of Medicine, on the 8th of February, M. La Tour related a case of peritonitis in which the symptoms were dissipated within twenty-four hours, by the application of a layer of collodion to the whole surface of the abdomen."[1]

POSTSCRIPT, *June* 7, 1852.

My anticipation respecting the utility of an artificial cuticle applied over the parts affected by commencing erysipelas, has, I find, been verified, as appears from the following paragraph taken from Dr Neligan's able Treatise on Diseases of the skin.[1]:

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[1] Bulletin de l'Académie Nationale, 1852.

"Acting as an impermeable varnish, and probably producing some effect, also, by the compression it causes, collodion has been successfully employed by Spengler and Rapp, as a local application in erysipelas. The parts are thickly coated with it by means of a camel's hair pencil, and it is renewed as often as may be required in consequence of its cracking and peeling off when dry."

When Dr Stokes heard of the success of Dr Graves in other cases, he resolved to try the gutta percha solution in smallpox, and the result of two trials is most encouraging, and leads to the hope that at length a means of preventing the formation of disfiguring scars on the face in that disease has been discovered. Dr Stokes has allowed Dr Graves to publish the two following cases treated by him at the Meath Hospital, and noted by this clinical clerk, Mr Robert P. White.

Anne Kenny, aged eighteen, was admitted into the Meath Hospital, 11th May 1852. She was never vaccinated; her illness began on the 6th of May by rigors, headach, and pain in her loins, but without any vomiting. On the 8th, the eruption appeared, and on coming into hospital, the eruption was well formed and confluent on her face; the fever of a typhoid character, with considerable prostration of strength; she was much annoyed with pain and itching of her face. She was ordered wine and carbonate of ammonia mixture, and her face to be painted with a solution of gutta percha in chloroform.

The solution was applied with a soft brush; the entire face being well coated with it, and after an interval of a few minutes (just sufficient to allow the previous coating to dry), a second coat of the solution was applied.

This application, she said, gave her great relief, and allayed the pain and itching. On the 13th she was much better, and the solution was again applied in the same manner.

22d May. She has proceeded most favourably; all the crusts have come off the face in large pieces, and there is hardly any trace of the disease remaining except a slight discoloration. During the whole time of her illness, from the application of the solution, her face continued moist, and there was no ulceration in any place.

Catherine Sherlock, aged twelve, was admitted 13th May (seventh day of eruption). Her illness commenced by headach, pain in her loins, and rigors, but without sickness of the stomach; she was never vaccinated. On admission she had a good deal of fever of a typhoid type; the eruption had come out well, was confluent, and had completely covered her face; she complained very much of pain and itching of her face and head, which kept her from sleeping. The solution of gutta percha was applied as in the former case, and apparently gave her much relief, for she was easier afterwards, and ceased rubbing and tearing her face in the manner in which she had been doing before. Wine was also freely used as in Kenny's case.

22d May. All trace of the disease has nearly gone, the crusts coming off in large pieces, and the remaining marks of the disease being very trifling when compared with the violence of the attack.

The same effect of the solution in keeping the face moist was also observed in this case as in the preceding.

In communicating these cases, Dr Stokes observed, as worthy of notice, and probably connected with the beneficial result produced, that the most remarkable effect of the gutta percha was to keep the face constantly moist, and to prevent the formation of hard irritating crusts. He also mentioned a singular illustration of the effects of total exclusion of air from the cutaneous surface as a preventive of the eruption in small-pox. It was that of a man who, while in the Meath Hospital for a scrofulous enlargement of the knee-joint, was attacked with this disease; the knee had been previously tightly strapped with adhesive plaster, and on the disappearance of the eruption, it was seen, on removing the strapping, that not a single pustule had been developed on the parts which were thus covered.

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[1] Page 48.

It is scarcely necessary to add, that however useful solution of gutta percha in chloroform, or any other topical applications, may prove, it would be, nevertheless, absurd to expect from them a radical cure of those chronic cutaneous affections which arise from constitutional causes, whether strumous, syphilitic, or cancroid. As well might we look for the cure of scarlet fever, smallpox, or measles, by means of remedies applied to the skin solely with the view of relieving the eruption. Still, in every chronic disease, it is manifestly desirable to diminish, by topical means, the annoyance or disfigurement arising from the cutaneous affection. This relief cannot but be serviceable if it did nothing else than afford time for the due and gradual employment of a well-directed constitutional treatment. Dr Graves saw this lately well exemplified in the case of a young lady who had been under the care of an eminent London surgeon for many months, and from whose medicines she had derived no relief. She was the subject of a most disfiguring eruption, agreeing in character with the *lupus serpiginosus* of late writers; it occupied sparsely the nostrils and cheeks, but on the forehead it formed an extensive group of sores. Some spots it left hypertrophied after healing, but in general its course was marked by white depressed seams. It had been the seat of constant irritation, which the patient could not avoid increasing by scratching during sleep, and consequently the surface of the face usually exhibited a number of bloody points, adding to its disagreeable appearance. The entire eruption healed after a six weeks' application of the gutta percha, and she is now (what she had not been for two years) free from any cutaneous irritation. Time alone can determine whether relief will be permanent; but there can be no doubt of the great value of the advantage already gained.

Dr Graves observes that, in psoriasis and other chronic cutaneous complaints unattended with any constitutional derangement, it is of the greatest consequence to check the growth of each new spot. This the gutta percha does most effectually in psoriasis, and when applied daily to any recent points of irritation, it smothers, as it were, each nascent centre of future blotches.

CELLANEOUS.

1. *Death of Orfila.*—The foreign papers announce that M. Orfila, well known as a toxicologist and chemist, died at Paris on Saturday the 12th of March 1859, after a severe illness, at the age of seventy years.

M. Orfila was well known to be by birth a Spaniard; but had become by residence, habit and manners, completely a Frenchman; and it is said that he received letters of naturalization in the early part of the reign of Louis-Philippe.

In 1805 M. Orfila, at the age of twenty-two years, went to sea in a merchant vessel, as it was intended by his friends that he should enter the navy; but as he had already formed a strong inclination for the study of medicine, he speedily abandoned the sea, and went to Valentia to study anatomy, chemistry, and natural history. As a student he distinguished himself by his industry in the acquisition of knowledge, and bore off the first prize for Chemistry and Physics. A favourable report of his attainments and talents was made to the Junta of Barcelona; and that body resolved to send him to Paris in order to study the physical sciences, with an annual appointment of 1500 francs, equivalent to sixty pounds sterling. He came to Paris in the year 1807; but in the course of ten months after his arrival in the metropolis of France, war broke out between France and Spain. This event had the effect of depriving him of pecuniary resources for continuing his studies. An uncle, however, who was established at Marseilles, undertook to provide him with 1500 francs of annual allowance until he should obtain the diploma of Doctor of Medicine, when this allowance was to cease. M. Orfila passed an excellent examination and obtained his diploma with credit.

Now, however, it became necessary for him to obtain the means of subsistence in a regular and respectable manner. He commenced a course of lectures on Chemistry, which was well attended, and which he continued to deliver with increasing popularity every year. He soon acquired particular reputation in the department of Toxicology and the explanation of the tests for poisons;—a subject which was at that time to a great extent new, and never before treated in a systematic manner. In the years 1814 and 1815 he published his *Toxicologie Generale* in four parts and two volumes,—a work which must be regarded as marking a great era in the history of the Medical Sciences.

Previous to this time a considerable amount of information on the effects of poisons had been recorded by different authors; from the days of Wepfer, who in 1715 collected not a few curious and important facts on the effects of *Cicuta virosa*, *Conium*, bitter almonds, *Cocculus indicus*, *Nux vomica*, antimony, arsenic, and various other articles, down to the times of Bromfield, Sir George Baker, Broadbelt, Gataker, Percival, Brodie, and Babington.[1] But all were scattered in various short treatises, and the transactions of scientific bodies. The mind of an able chemist and physiologist, a learned and diligent writer, was required to collect these scattered fragments of knowledge, and reduce them into systematic order, so as to render them really serviceable to the purposes of the profession. This duty Orfila undertook and accomplished with singular ability and skill. His Elements were, in truth, the first systematic treatise on Toxicology, and by the immense amount of original information which the author himself had communicated, as well as by collecting in one treatise all the scattered facts upon the action and effects of poisons, gave the first distinct and methodical view of the extent and importance of this branch of medical science. The value of the work was immediately recognised in every European country; and a Translation into the English Language appeared at London in 1815 and 1817. Scarcely, however, was this accomplished when a second edition of the original was required; and this appeared at Paris in 1818 with many additions, corrections, and improvements; while the same year he published his short practical essay, or manual, containing directions for the recovery of persons poisoned or asphyxiated.[1] This was republished in 1825 and 1830.

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[1] Johannis Jacobi Wepferi Historia Cicutæ Aquaticæ, &c. Lugduni Batavorum, 1733.

The mind of M. Orfila, and his particular taste for chemical researches as applied to medicine, led him to cultivate with assiduity and perseverance the department of Medical Chemistry; and in 1817 he published, at Paris, in two volumes octavo, his *Elemens de Chimie Medicale.*[2] This work, though excellent in its way, never became so generally known and esteemed as his treatise on Toxicology. A fourth edition, however, was published in 1828; it reached a fifth edition in 1831, and a sixth in 1836. Orfila, indeed, seemed above all to be well adapted for a teacher in Toxicology and Legal Medicine; and he may be said next, to Chaussier, to have created these sciences. In 1821, he published his Lectures, forming part of the course of Legal Medicine;[3] and in 1823 a more comprehensive work, Lectures on Legal Medicine, in two volumes.[4] By this time Orfila was the great Medico-Legal and Toxicological authority in Paris; and he numbered among his auditors many physicians and chemists who have since risen to deserved eminence. Among these may be mentioned M. Jules Cloquet, M. Beclard senior, and M. Edwards; and not a few in this country.

In 1816, M. Orfila had been appointed one of the physicians of Louis XVIII., an office chiefly honorary and not always implying distinguished merit. But, in 1822, he was elected Professor of the Faculty of Legal Medicine, and, in 1823, he was appointed to fill the office of Professor of Chemistry. In 1826, a new Edition of the Toxicology, with many additions and rectifications, was published under the title of Treatise on Poisons; and it was afterwards republished with suitable additions in 1843.

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[1] Secours à donner aux Personnes Empoisonnées in Asphixées. 12mo. Paris, 1818.

[2] Elemens de Chimie Medicale. Deux tomes. Paris, 1817.

[3] Leçons faisant partie du Cours de Medecine Legale. 8vo. Paris, 1821.

[4] Leçons de Medecine Legale. Deux tomes, 8vo. Paris, 1823.

After the revolution of 1830, he was successively elected Dean of the Faculty, Member of the Council-General of Hospitals, and Member of the Council-General of the Department. After he had received the letters of naturalization, he was appointed a Member of the Board of Public Instruction, and was successively named Chevalier, Officer, and Commander of the Legion of Honour. In a scientific and professional point of view, these titles appear insignificant and of little moment. Such, in truth, they are, to the mind that views real merit, resting on the foundation of superior mental attainments. But in France, as in all continental countries, the predominance of the military element has caused rulers and the public, to attach importance and esteem to distinctions and titles derived from military orders. To the reputation of Orfila, they could add nothing. His name, probably, already of European distinction, might confer honour on the order.

In 1829, along with various other distinguished members of the profession in Paris and the departments, he concerted and commenced the Annales d'Hygiène Publique, and continued, for fully twenty years, one of the most active contributors to that valuable publication. His reports in this work alone would form a considerable treatise.

The authority of M. Orfila on questions of juridical medicine and medical police had caused him to be consulted on almost all questions, civil and criminal, requiring the exercise of Medico-legal and Toxicological knowledge; and his reports and opinions on these subjects had now become numerous. In 1831, he published along with M. Lesueur, in two volumes octavo, his Treatise on Juridical Disinterments,[1] one branch of the public duty on which he had been much engaged. These volumes contain a large amount of useful information; and the reports are, in many respects, models for the preparation of reports on these doubtful and often difficult questions. These reports were afterwards published in the Treatise on Legal Medicine. [Paris, 1836.]

In the case of Madame Laffarge, as in most criminal cases, the opinion of Orfila was anxiously sought by the public authorities; and though, in this instance, his opinion was opposed to that of several other chemists and physicians, as to the possibility of poisons being received by the human body after interment, from the earth in which they are deposited, and created much sensation, it was finally admitted that the opinion was well founded.

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[1] Traite des Exhumations Juridiques. Deux tomes. 8vo. Paris, 1831.

During the whole reign of Louis-Philippe, M. Orfila remained at the head of the Faculty of Medicine; but after the revolution of February 1848, the Provisional Government revoked his functions. Other circumstances also took place, which shewed that the elevated position which he occupied, was not patiently submitted to by various professional persons. Into this matter it is not necessary to enter. It is probable, that some degree of invidious feeling may have actuated some of those, who appeared to blame his conduct. His reputation as a scientific chemist and medico-legal authority must remain unimpaired, so long as accuracy and precision, careful inquiry and logical conclusions on doubtful questions, are held in estimation.

M. Orfila suffered physically for some time before his death; and his mind had been long severely tried by the illness of his son, who had become epileptic and so much disordered in the mental faculties, that it was found necessary for security to place him in one of the establishments called, by a sort of euphemism peculiar to France, *Maisons de Santé*;—in short, a lunatic asylum.

From the many experiments upon animals, which Orfila found it requisite to perform, in ascertaining the effects of poisons, he has been more than once charged, in common with Magendie and other experimental inquirers, with cruelty. It is impossible to deny that all these experiments are accompanied with a considerable amount of animal suffering, so much, indeed, that it is painful to any person of common feeling to think upon them, and greatly more so to behold them. The only thing that can be said in favour, or at most in defence and extenuation of these experiments is, That it is impossible otherwise to obtain the desired information; and as men do not scruple to put to death not in very pleasant modes various animals for mere sport, as pheasants, partridges, grouse, hares, deer, it is surely beginning at the wrong end to complain of scientific inquirers, who seek the professed object of alleviating and preventing human suffering, while no censure is pronounced on those who, without any object in view but that of amusement, kill and wound in the most barbarous manner hundreds of harmless birds and quadrupeds, not to speak of the cruel sport of spearing salmon.

The Medical Profession and the public in general will learn with regret that Jonathan Pereira, M.D., F.R.S., expired suddenly, on Thursday, the 20th January 1853, at his residence in Finsbury Square, in his 49th year, in consequence of some internal organic disease. A few weeks ago, Dr Pereira, when on a visit to the Hunterian Museum, fell down and ruptured one of the extensor muscles of the thigh; from the consequence of which injury he was gradually recovering up to the time of his decease. Dr Pereira occupied deservedly a high position in his profession, and had rendered himself well known by his valuable work on Materia Medica and Therapeutics, originally published in 1840. The third edition of this comprehensive work was published to the extent of the first volume and the first part of the second; and it is understood that with the second part of the second volume he was busily engaged when arrested by death.

Dr Pereira was Physician to the London Hospital, and Examiner in Materia Medica and Pharmacy to the University of London, and member of several British and continental learned societies.

We regret to observe that the death of George Gregory, M.D., for thirty-one years known as the indefatigable Physician to the Smallpox Hospital, is announced as having taken place on Tuesday, the 25th January 1853, at his residence in Camden Square.

2. CORRESPONDENCE ON THE REPEAL OF THE GRADUATION STAMP.

Bath, Queen's Parade Place,
November 1852.

Dear Sir,—The Committee of British Graduates appointed at the General Meeting, held at Oxford on the 22d July last, "to communicate with the Royal College of Physicians in relation to the proposed New Charter," have great satisfaction in forwarding you a copy of a communication received from Dr Hawkins, in reply to a letter containing the resolutions unanimously passed at the meeting at Oxford.

They at the same time desire to offer their sincere congratulations to their fellow Graduates, on the kind and conciliatory spirit shewn to their suggestions by the College.

It is, however, absolutely necessary, that all British physicians now practising in England and Wales, without the diploma of the College, should heartily unite in strengthening the efforts of the College for the remission of the Stamp-duties.

The Committee earnestly hope that you will assist them in their efforts to aid the College to procure a remission of "*a tax which, compared with other analogous stamp-duties, does appear to be disproportionately heavy.*"

To do this effectually, your Committee would urge the necessity of forming branch committees to co-operate with them; *First,* to memorialise the College again to remonstrate against "*an impost pressing on it so heavily;*" *Secondly,* to memorialise Her Majesty's Government, praying for the remission of a tax which, in a great degree, tends to prevent the British physician, not practising in London, from becoming a Member of the College; and, *Thirdly*, if necessary, to petition the House of Commons against an impost which, while it adds but little to the revenues of the country, presses severely upon a class of men ready at all times in hospitals and dispensaries to devote their time and talents gratuitously in the service of their sick and afflicted fellow-subjects.

In conclusion, I have to inform you, that some necessary expenses must be incurred by your Committee, for which no funds are available; I am, therefore, directed by them to solicit subscriptions, so that by the earnest co-operation of the provincial physicians, the College may be enabled to procure a charter, which, inflicting no injury upon any class, will be the means of uniting us all in one royal incorporation, to the manifest advantage, not only of the profession, but of the country at large.—I have the honour to be, dear Sir, your faithful Servant,

JAMES TUNSTALL, M.D., Edin.,
Honorary Secretary.

ROYAL COLLEGE OF PHYSICIANS, LONDON,
November 11, 1852.

SIR,—I am directed by the Charter Committee of the Royal College of Physicians, to request that you would communicate to the British Graduates in Medicine, who held a meeting at Oxford on the 22d of July 1852, that the Committee has taken the earliest opportunity, which offered itself after the recess, of considering the resolution passed at that meeting, a copy of which you have been good enough to forward to the College; and, further, that you would assure the British Graduates that it is highly gratifying to the President and the Committee, as it will be, doubtless, to the Fellows at large, to learn that the provisions of the proposed new Charter for the College were thought by the meeting to be extremely liberal.

With respect to the suggestions contained in the resolutions, viz.:—"Whether the clause relating to the fees payable upon admission to Membership by those who, at the date of the Charter, are Graduates in Medicine of British Universities, be not open for reconsideration, with the view of reducing the amount to be paid for the diploma itself, especially by those who have long practised beyond the jurisdiction of the College, and of endeavouring to exempt all Candidates, being Graduates of British Universities, from payment of £15 stamp-duty, they having already paid a stamp-duty on taking their degree,"—the Committee deem it right to offer the following considerations:—

That the College of Physicians has public offices to discharge, and officers to remunerate, towards which it neither receives, nor ever has received, any payment or pecuniary assistance whatsoever from Parliament or the Government.

That the only endowment which the College possesses consists of bequests from some of its former Fellows, not sufficient for its ordinary services and for keeping the building in repair;—the building itself having been erected chiefly by means of the private subscriptions of some of the former and of the present Fellows.

The necessity, therefore, that those who receive licenses from the College should contribute towards its support is obvious; and it may be stated that the sum hitherto payable for this purpose, by every Licentiate, has been somewhat more than £40, exclusive of stamp-duty. This sum has been paid, although the License did not formerly confer the same eligibility as at present to the Fellowship. And every Licentiate must at that time have paid, in addition, fees (and probably stamp-duty), to some university, because a degree was, until lately, an indispensable requisite for the license.

Even the Extra Licentiates, who practise beyond the proper jurisdiction of the College, many of them being Graduates of British Universities, have each contributed about £20 to the College.

But, for several years, the number of Licenses annually sought and paid for has been smaller than heretofore, because many Physicians have been waiting in expectation that a new Charter would be granted to the College. Whilst, in the meantime, the College has already incurred considerable expense, and must incur expenses to a much larger amount, in order to obtain a new Charter from the Crown, and an Act of Parliament, without which the Crown has not the power to grant a Charter to the College. It seems but fair that these expenses should be defrayed, at least in part, by those who are to obtain, by means of this Charter, both legal rights and corporate privileges.

When first the proposition was made by the College, to receive as Members, under a new Charter, all British Graduates properly qualified, without examination, and at a reduced fee, that fee was fixed at £25. Readily, at the suggestion of the Council of the Provincial Medical and Surgical Association, it was further reduced to £15.

The Committee taking all the circumstances now stated into consideration, would not feel itself justified in recommending the College to reduce the fee still further.

With respect to the exorbitant stamp-duty of £15 on every license, and £25 on the diploma of every Fellow, the College is not assuredly a consenting party to an impost pressing upon it so heavily. It has several times remonstrated against it. It will be ready to co-operate heartily with the British Graduates in the endeavour to persuade the Legislature to remove or lighten a tax, which, compared with other analogous stamp-duties, does appear to be disproportionately heavy. Whilst, on the other hand, the conciliatory tone of the resolution encourages the Committee to hope that the College will meet with the cordial co-operation of the British Graduates in the attempt to obtain the proposed new Charter.—I have the honour to be, Sir, your most obedient Servant,

FRANCIS HAWKINS, M.D., *Registrar.*

To JAMES TUNSTALL, Esq., M.D., &c. &c.,
Bath.

3. MEDICAL REFORM BILL:—DEPUTATION TO LORD PALMERSTON.

ON Friday the 18th of March, a deputation of the Provincial Medical and Surgical Association waited, by appointment, upon Lord Palmerston, at his residence in Carlton Gardens, to present to his Lordship the Bill that they have prepared for the regulation of the medical profession, and to request him to introduce it into Parliament as a Government measure.

The deputation consisted of Sir Charles Hastings, M.D., D.C.L., President of the Council; A. Robertson, M.D., of Northampton; Geo. Webster, M.D., of Dulwich; Mr Noble, of Manchester; Mr Southam, of Manchester; Mr Cartwright, of Oswestry; Mr Bree, of Stowmarket; Mr Bottomley, of Croydon; Mr Stedman, of Guildford; Mr Walsh, of Worcester; Mr Nunnely of Leeds; Mr Hastings, Barrister,—being the Committee of the Association who have charge of the bill; John Forbes, M.D., President of the Metropolitan Counties' Branch; J. C. Williams, M.D., Nottingham, President of the Midland Counties' Branch; C. Chadwick, M.D., Leeds, President of the Yorkshire Branch; J. Bedingfield, M.D., Needham Market, President of the Suffolk Branch; J. Heygate, M.D., Derby; Mr Norman, Bath; F. R. Horner, M.D., Hull; G. S.

Jenks, M.D., Brighton, Vice-Presidents of the Association; J. Conolly, M.D., Hanwell; C. Cowan, M.D., Reading; W. P. Brookes, M.D., Cheltenham; Mr Nunn, Colchester; Mr Clements, Shrewsbury; H. Johnson, M.D., Shrewsbury; E. V. Mainwaring, M.D., Bournemouth, Members of the Council; Dr Renton, late President of the College of Physicians of Edinburgh; Dr Combe, President of the College of Surgeons, Edinburgh; Sir John Liddell, of the Medical Department of the Navy; and Mr Wakley, late M.P. for Finsbury.

The following Members of Parliament accompanied the deputation. The Right Hon. T. B. Macaulay; the Right Hon. M. T. Baines; the Right Hon. T. M. Gibson; Lord Alfred Hervey; Lord Elmley; Lord Hotham; Mr O. Ricardo; Mr Water; Mr Brotherton; Sir G. Pechell; Sir T. Winnington; Capt. Rushout; Mr Laslett; Mr B. Westhead; Sir H. Willoughby; Mr W. Knight; Mr Crawfurd; Hon. R. H. Clive; Mr Cobden; Sir G. Goodman; Mr Bright; Hon. Captain Duncombe; Mr Alcock; Mr Pigott; Mr Phinn; Mr Langton; Mr Raikes Currie; Mr Booker; Mr Aglionby; Mr Tomline; Mr Whalley; Mr C. Berkeley; Mr G. Berkeley; Mr Brown; Mr Martin; Mr Price; Mr Headlam; Mr Cobbett; Mr Bass; Mr Drummond: Mr Mangles; Mr Bell; Mr Stafford; Viscount Newark; Mr Barrow; Mr Vernon; &c.

The deputation having been courteously received by Lord Palmerston, Sir Charles Hastings addressed his Lordship on their behalf, and said that the Provincial Medical and Surgical Association had existed for twenty-one years, and numbered nearly two thousand members, residing in all parts of the kingdom. It was established for the advancement of Medical Science; but, finding many obstacles from the incongruous state of the profession, they had found that it was absolutely necessary to improve the organisation of the profession. They had, from the first, laid down broad principles of medical reform, and had never swerved from them. These were, uniformity of qualification, equal right to practise throughout the United Kingdom, and the adoption of the representative principle in the formation of the councils or other governing bodies. They had from time to time presented petitions to Parliament, and memorials to Government on the subject; and, within the last three years, Sir G. Grey had expressed a resolution to give his sanction to any measure that might be generally approved of by the medical profession. Since that time a Committee of the Association had framed a bill with the assistance of Mr Hastings, a barrister, which had been repeatedly submitted to the profession, through the medical societies, and the district branches; and it had been altered and improved to meet various suggestions. As the result of their labours, he might now state that the bill had received an unparalleled amount of support. The London College of Physicians had given it their approval, and declared that it was in harmony with their preposed new charter. A deputation from the Edinburgh Colleges
present to express their approval; and it was warmly supported
vast majority of medical practitioners throughout the Kingdom.
no opposition had been made to its principles, tho
might have been taken to its details. The bill en
ment of a Medical Council, of a Board of Examin
candidate for a right to practise must go, and of
Sir Charles then expressed the wish of the C
objections be made to the measure, his Lords
portunity of replying through their secre
placing the bill in his Lordship's hands,
fit to pass it into law, and thus to confer
medical profession, but on the sick an

Dr Renton and Dr Combe, on behalf of the medical Colleges of Edinburgh, then expressed their perfect approval of the bill.

Sir John Liddell pointed out the need of better education for medical officers in the navy; at present they had men well versed in surgery, but ignorant of pharmacy, and *vice versa*. The establishment of a common Board of Examination would remedy this evil.

Mr Wakley then addressed his Lordship, and said that he had been engaged for twenty-nine years in the work of medical reform, but never till now had he seen much hope of a successful result. Various measures had been introduced into Parliament by Sir James Grahame, and by himself, but they had all failed. Now, however, there was a very great approach to unanimity on the subject; and if Lord Palmerston took up the bill as a Government measure, which he implored him to do, it would receive the most powerful support, it would pass into law without any serious opposition, and would be productive of incalculable good.

Dr Webster, as an old medical reformer, and one supposed to take rather extreme views, begged to express his entire concurrence in the bill.

Mr Brady, M.P., and several other gentlemen, having spoken to the same effect,

Lord Palmerston said that he was deeply impressed with the subject which had been brought before his notice by the deputation, affecting, as it did, not only the interests of the public, but those of a most highly educated and important profession. Many attempts had been made to legislate on it, but without success. When out of office, some years since, he had been requested to take up the subject, but had declined to do so, on account of the discordant opinions then entertained by the medical profession. Now, however, a different feeling seemed to prevail, and a great approach towards unanimity had evidently been made, as was manifest from the importance and varied character of the deputation. He should give his best attention to the measure that had been laid before him; and if there was a good prospect of bringing it to a satisfactory settlement,—and he thought he saw, now, such an opportunity,—he should feel it his duty to bring it before Parliament, in conjunction with his colleagues, as a Government measure, and to carry it out with energy. His Lordship added that he should take an early opportunity of communicating with the secretary, Mr Hastings, on the subject.

Sir Charles Hastings thanked his Lordship, on behalf of the deputation, for his personal courtesy, and for his promise to take the Bill into his favourable consideration.

The deputation then withdrew.

LETTER FROM THE SECRETARY OF THE COMMITTEE TO THE EDITOR OF THE ASSOCIATION MEDICAL JOURNAL.

SIR,—As Secretary to the Committee of the Association, appointed at the anniversary meeting held at Oxford in July last, "to consider the Draft Bill prepared by the Central Council," I am anxious to announce to the members of the Association, through the medium of your columns, what have been the proceedings of the Committee up to this time, and what is the present position of affairs in regard to the Bill.

Shortly after their appointment, the Committee proceeded to give their best attention to the measure that had been committed to their charge; and, although scattered over the length and breadth of England, have held various meetings for the purpose of discussion, and have corresponded with me, and with each other, on the subject. One of the first resolutions at which they arrived was, that the measure ought, if possible, to be one for the whole of the United Kingdom ; and in pursuance of this determination, they appointed Mr Nunneley, of Leeds, and myself, as a deputation to confer with the Scotch medical bodies. I am happy to say that our visit to Edinburgh was attended with the happiest results ; that the Edinburgh Colleges agreed to the Bill. under certain very reasonable conditions, and that they have since afforded to the Committee a zealous and valuable support. We have also negotiated with the London Colleges of Physicians and Surgeons, and have received from the former an approval of the measure, given upon certain conditions, but in a liberal and disinterested spirit.

The Committee have also reason to believe that an alteration in the Bill, which would not affect its principle, nor diminish, in their opinion, its practical efficiency, would remove any objection which the College of Surgeons may have entertained towards it.

The Committee came a short time since to the resolution that as the principles of the Bill met with no opposition, and as the objections made all referred, more or less, to matters of detail, they would obtain an earlier solution of these minor difficulties, and thus better fulfil the trust confided to them, by submitting the measure to Lord Palmerston at once, and leaving the arrangement of these details to his Lordship's discretion.

Accordingly, on Friday, the 18th inst., the Committee, accompanied by a deputation from the Scottish Colleges, by a number of medical men from all parts of the kingdom, and by nearly sixty members of Parliament, waited upon Lord Palmerston, by appointment, and placed the Bill in his hands, with an earnest entreaty that he would take it into his favourable consideration.

As you will probably give an account of the interview in your columns, I need only say, that the answer given by his Lordship was one of the most satisfactory nature, and that he promised to communicate with me shortly upon the subject.

Until his Lordship's decision be known, it would be manifestly improper for me to enter into any more detailed explanation of the former proceedings of the Committee ; nor would I advise any immediate movement in the Association in favour of the Bill.

The Committee have appointed a sub-Committee, charged with the duty of making preparations for a vigorous agitation in favour of the measure, as soon as it shall be laid on the table of the House ; and their experience in the last fortnight has proved to them, that the amount of Parliamentary influence which they can bring to bear, is beyond their most sanguine expectations.

There can, therefore, be no doubt of ultimate success ; and I trust that, before the close of the Session, I may be able to congratulate the members of the Association on their having definitely settled the question of medical reform. I am, &c.,

G. W. HASTINGS.

OXFORD CIRCUIT, SHREWSBURY,
21st March 1853.

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